

Kew Bulletin

PUBLISHED FOR THE ROYAL BOTANIC GARDENS, KEW
FORMERLY THE "BULLETIN OF MISCELLANEOUS INFORMATION"

No. 3, 1949

CLASSIFICATION OF THE BANANAS

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III. Critical Notes on Species

k. *Musa laterita* Cheesman, sp. nov., habitu *M. ornatae* Roxb. similis ; bracteis rufis, pedunculo puberulente, petala calyce quadruplo breviora, fructu longiore differt.

This species is represented by Introductions nos. 225 and 226 in the I.C.T.A. collection. Two packets of seeds were received in February 1939 from C. W. D. Kermode Esq., Silviculturist, Burma, with data : (225) Thihmwe nget-pyaw. Collected from evergreen forest in Mezali Reserve and Kyaukchaunggyi unclassified Forests, Henzade-Bassein Forest Division, Bassein above 150 ft. sea level. (226) Yethilan nget-pyaw—other details the same. Two families of plants were raised, but they proved to be similar in all respects.

On trying to identify the species, I found our plants fitted the very brief description given by Kurz [Journ. Agric. Hort. Soc. India **14**, 301 (1865–66)] of *Musa rubra* Wallich. This species does not seem to have been described by Wallich himself, and all the information I can find about it is given here. Kurz says : Spathes red ; fls. orange-coloured ; interior petal short ; fruits and seeds smooth. (Burma). J. G. Baker [Ann. Bot. **7**, 221 (1893)] gives a longer description as follows :

"*M. rubra*, Wall. ; Kurz, in Journ. Agric. Hort. Soc. Ind. **14**, 301. Habit of *M. coccinea*. Leaves oblong-lanceolate, $1\frac{1}{2}$ –2 ft. long, 6–9 in. broad at the middle, acute, deltoid at the base ; petiole slender, a foot long. Peduncle and panicle erect, the latter at first dense, the fruiting part finally $\frac{1}{2}$ –1 foot long ; nodes very numerous and crowded ; bracts bright red, glabrous ; lower sterile, lanceolate, a foot long ; upper oblong, 3–4 in. long. Calyx yellow, an inch long, 5-toothed at the tip ; petal lanceolate, half as long as the calyx. Fruits in 3–4 clusters of 3–4 each, cylindrical, glabrous, dry, $1\frac{1}{2}$ –2 in. long, $\frac{1}{2}$ in. diam., narrowed to the base in a distinct short stipe. Seeds smooth, dull brown, $\frac{1}{8}$ in. diam. Rangoon, M'Clelland ! Yomah, Pegu, Kurz, 3282 ! 3283 ! Differs from *M. coccinea* by its short petal."

Kew Bulletin, Addl. Ser. 6, 30 (1906) adds, after an abridgement of Baker's description : [Bot. Mag. t. 7451].

Now our plant has brick-red bracts, orange-coloured flowers, a short free tepal and smooth seeds, and it comes from a locality not far from Pegu. But it certainly has not the habit of *M. coccinea*, and is larger in all its parts than the plant described by Baker. Bot. Mag. t. 7451 (1895) has bright pink bracts and does not seem to be our plant either. The question is whether Baker's plant was the same species as Kurz's or another. I am inclined to suspect that Baker sometimes mixed characters from earlier descriptions or dried specimens with those of a (misidentified) plant growing at Kew under the same name. But in this case his citation of Kurz specimens is positive, and he could hardly have described any specimen from our species as having the habit of *M. coccinea*. Furthermore, there is a species in Siam (Kerr 6143, 4561) which would apparently fit Baker's description, and what appears to be the same occurs in Burma (Lace 5408, Toungoo, in Herb. Kew. labelled "*Musa* cf. *rubra* Wall.") and this may be the true *M. rubra* Wall. ex Kurz.

Thus there are certainly at least two species of *Musa* in Burma with erect inflorescence and red bracts, both apparently referable to section *Rhodochlamys*. I conclude that further enquiry is desirable to establish the identity of *M. rubra* beyond question, and until that is possible our species must be described as new and Baker's description be accepted with reserve as applying to *M. rubra*. Our species, called *M. laterita* from its brick-red bracts, may be described as follows :

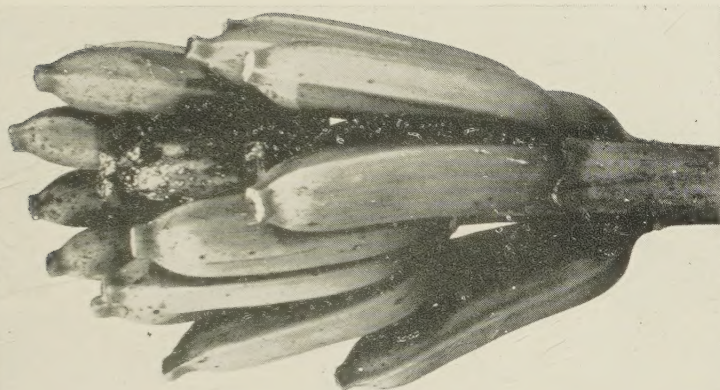
Plant tillering freely, sending up suckers at long distances from the parent stem and forming only lax open stools. Pseudostems slender, 1-2 metres high, green, devoid of any perceptible wax bloom. Leaf blades up to about 1 m. 50 long and 40 cm. wide, medium dark green above, scarcely paler beneath, truncate at apex, narrowing rather gradually to an acute base and finally decurrent as moderately prominent petiole-margins, which closely clasp the pseudostem at base and early become scarious at the region of junction ; midrib flushed red on the lower surface ; petioles 40-50 cm. long.

Inflorescence quite erect ; peduncle velvety with a dense minute puberulence ; first sterile bract usually a foliage leaf with a broadened petiole developing red colour, this followed by one sterile true bract 20-30 cm. long. Flowers of the basal bracts female, usually about 4 "hands" of 4-6 flowers each. Female flowers 7-8 cm. long overall, the perianth about as long as the ovary, free tepal $\frac{1}{4}$ to $\frac{1}{3}$ as long as the compound tepal, the latter yellow, its lobes little darker in colour than the rest.

Male bud in advanced blooming ovate, the bracts slightly imbricate at the tip. Bracts bright brick-red, much the same colour within as without, slightly glaucous on the outside and rather strongly sulcate, without wax on the inside and transversely corrugated between the ridges.

Male flowers about 6-10 per bract in two rows ; compound tepal about 4 cm. long, 1.8 cm. wide, orange-yellow, its tip and lobes slightly darker, the lateral lobes 5 mm. long, with a minute dorsal appendage ; free tepal scarcely more than 1 cm. long, boat-shaped, orbicular if flattened

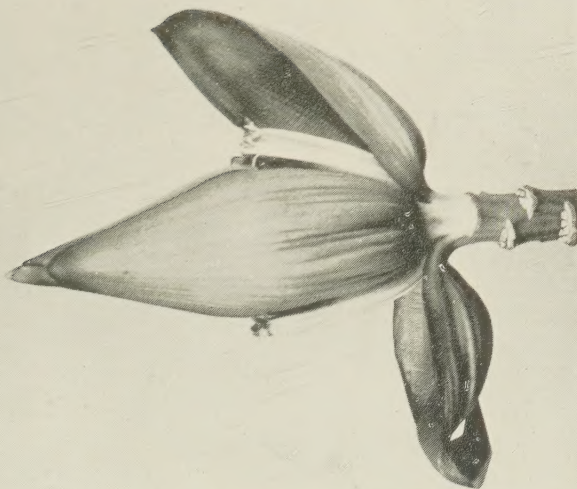
PLATE 1.



M. laterita sp. nov.

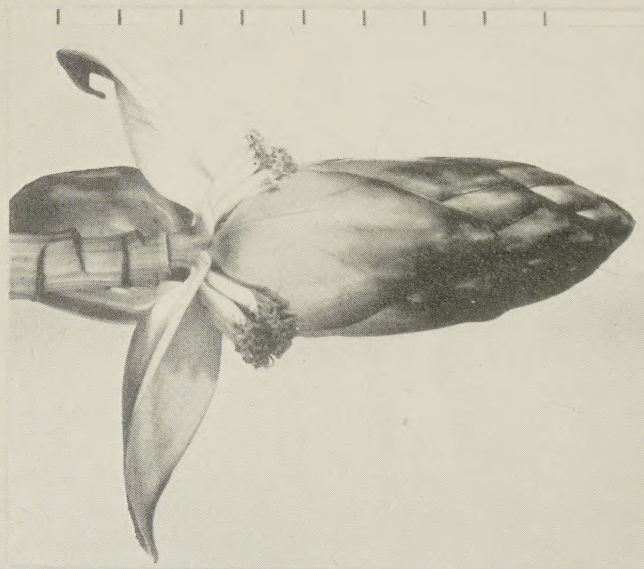
FIG. 1. Male bud in advanced blooming.

FIG. 2. Fruit bunch approaching maturity. (N.B. the rachis has been severed and the male bud, normally persistent, removed).



Scales in inches.

Photographs by K. S. Dodds.



M. textilis Née sensu Baker.

FIG. 1. Male bud in advanced blooming.

FIG. 2. Fruit bunch approaching maturity.

Scales in inches.

Photographs by K. S. Dodds.

out, with a small apicula ; stamens as long as the compound tepal, the filaments a little longer than the anthers.

Fruit bunch very compact, the fruits almost appressed to the rachis. Individual fruit about 8–10 cm. long, 2 cm. in diameter (fresh), on a very short pedicel and with a short (0.5 cm.) but pronounced acumen ; ripening yellow and remaining strongly angled at full ripeness.

Seeds dull black, irregularly depressed-globose, smooth, 6–7 mm. across and 3 mm. high.

Habitat : Burma, in evergreen forest, Bassein. Described from plants in cultivation at the Imperial College of Tropical Agriculture, Trinidad, B.W.I.

Relationships : Chromosome number $n = 11$ (K. S. Dodds, unpublished). Referred on this and habit to *Musa* § *Rhodochlamys*. Has strong resemblance in general appearance to *M. ornata* Roxb. but does not in genetical behaviour show very close affinity with that species, though it hybridizes with it. Has also been crossed with *M. acuminata* Colla and *M. balbisiana* Colla in the section *Eumusa*. By its male flowers being in two rows (at least in the lower bracts) and by its very short free tepal it approaches *Eumusa* more closely than some other species of the section *Rhodochlamys*, but its exact relationships remain to be worked out from genetical investigations.

CLASSIFICATION OF THE BANANAS

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III. Critical Notes on Species

1. *M. textilis* Née in Anal. Cienc. Nat. 4 (1801) 123.

The name *M. textilis* is generally understood as referring to a species from which is prepared a commercial fibre known as Manila hemp or abacá. This species is apparently a native of the Philippine Islands, has long been cultivated there for its fibre, and exists in a number of recognised varieties. The first use of the name occurs in a general account of the abacá industry in the Philippines by Née, which includes some botanical details but not enough to fix a type with precision. This fact does not necessitate the rejection of a name well established by usage, but it does necessitate some definition of the sense in which the name is to be used. Not all *Musa* fibre is abacá, and some confusion has arisen in the literature through application of the name *M. textilis* to fibre-yielding plants of more than one species.

The nomenclature of the abacá plant was discussed in 1927 by E. B. Copeland (Philippine Journ. Sci. 33, 141–153) who very usefully brought together in one place the various “descriptions” by authors from Rumphius (1750) to Miquel (1855) which have to be weighed in deciding on nomenclature. As that publication is relatively recent and accessible, there is no need to reproduce the extracts here.

Copeland, however, did not advance any working definition of the species, being more concerned to point out the desirability of fixing a type and the methods to be adopted to that end. His attitude towards the problem may be indicated by this extract from his comments :

"It is perfectly clear that Née intended to include in his species any and all *Musa* plants characterised by the production of fiber rather than of fruits ; but even superficial observation of the various fiber-producing *Musas* shows that, according to the more modern conception of 'species', these plants represent not one species, but several, and more careful study of their botanical characters makes this fact only clearer. Before an attempt to give a botanical status to these natural species can be made, it is necessary to identify some one of them as typical *M. textilis*, thus giving to this name a more definite and restricted use than its author intended. For this purpose, we have a medium of description, and a collection of vernacular names which might identify a definite type locality, and thus help to identify a particular plant."

After some discussion along the lines indicated, Copeland concluded :

"Taking into account the scanty items of Née's description, the present use of the vernacular names he cites, and the fact that he wrote when the abacá industry was comparatively undeveloped, we may conclude with considerable confidence that typical *Musa textilis* is now to be found in the mountains rather than in the plantations of Camarines. Whether this conclusion carries in itself the identification of a type, or whether it remains to choose a type among two or more wild species, can be determined only after reasonably careful collection in the locality. It can of course hardly be doubted that *M. textilis* is represented in the Bicol plantations, whether or not by a typical form ; but it is neither proven nor probable that all or most of the abacá cultivated there is descended from any local wild plants. One of the commonest cultivated "varieties" is called "Sa Moro", a name indicating almost certain introduction from Mindanao."

These extracts are quoted because they indicate a complex population that obviously has to be analysed on the spot, with full local knowledge, and cannot be discussed at a distance. The fact is, however, that whatever Née's type may have been, and however mixed the material on Philippine plantations, the name *Musa textilis* as generally used today outside the Philippines is attached to one particular species, quite well defined in major characters. This species has been introduced from the Philippines and grown in botanic gardens and experiment stations all round the tropics, and is the entity with which we are here concerned. There is good evidence also, in varietal names used in Philippine agricultural literature, that the same species is the major component in the mixture passing under the name of abacá within the Philippines, and may therefore appropriately bear the name *M. textilis* at least until Née's type is defined by local research..

This species has been grown at Kew, among other places, and includes almost certainly the plant chiefly in J. G. Baker's mind when he described *M. textilis* in his synopsis of *Museae* of 1893 (*Ann. Bot.* 7, 211), as well as that illustrated in *Kew Bulletin* of 1894 at p. 290. It has been described in detail by C. A. Backer (*Flora van Java* 3, 134) from cultivated specimens in Java. As Baker seems to have been the first author to couple

the name *M. textilis* with the description of a plant with " bracts firmer in texture than those of *M. sapientum*, naked and polished outside, not at all pruinose, brown", which is a conspicuous character of our species, I suggest that "*M. textilis* Née *sensu* Baker " may serve as a convenient and accurate designation of the species pending definition of Née's type.

In the I.C.T.A. *Musa* collection we have a clone (I.R. 71) obtained from the Botanic Garden in St. Vincent, B.W.I. in 1926. This is most probably descended from material sent out from Kew about the time that Baker's monograph was written, though it may have been in the St. Vincent garden (which dates from 1764) much longer. We have also I.R. 239 received as *M. textilis* var. Libuton and I.R. 240 received as *M. textilis* var. Tangonon. These came from the United Fruit Company's collection in Honduras, and there is no reason to believe that they are not true to label. As Tangonon and Libuton are both mentioned in Philippine literature as important varieties of abacá, these plants constitute our evidence that what we call *M. textilis* is conspecific with at least some, and probably much, of the abacá of the Philippines. From our living material I compile the following general description :

***Musa textilis* Née**, in Anal. Cienc. Nat. **4**, 123 (1801) *sensu* J. G. Baker in Ann. Bot. **7**, 211 (1893) *excl. syn.* ; Kew Bull. 1894, 290 ; C. A. Backer in Flora van Java **3**, 134 (1924).

Plant stooling freely ; pseudostems 2·5–4 metres high, 15–20 cm. in diameter at base, green or more or less purplish or even almost black towards the base ; leaf sheaths and petioles devoid of wax.

Leaf blades oblong, narrowing towards the apex, 1·5–2 metres long, 40–50 cm. wide, narrowly truncate at tip, rounded at base, the two sides unequal at base, midribs green like the lamina ; petioles 40–50 cm. long, relatively stout and stiff, holding the leaves at a high angle, their margins distinctly developed, incurved, almost covering the adaxial groove above, closely appressed to the pseudostem at base, not becoming scarious.

Inflorescence at first subhorizontal, its peduncle and rachis glabrous or minutely puberulent ; sterile bracts green, up to 50 cm. long, very acute ; basal flowers female, the number of female " hands " varying up to about 6, upper hands male.

Female flowers about 10 per bract in two rows ; ovary 5 cm. long, green, glabrous ; compound tepal 4 cm. long, 1·2 cm. wide, white with pale green lobes, the lateral lobes oblong-lanceolate, 5 mm. long, with filiform dorsal appendages also 5 mm. long, centre lobe also with a dorsal appendage but somewhat shorter ; free tepal 3·5 cm. long, 2 cm. wide, white, boat-shaped, corrugate in the upper third, with a minute apicula ; staminodes about half as long as the styles.

Male bud in advanced blooming oblong-ovoid, blunt, the bracts very strongly imbricate, the outermost being only about two-thirds the length of the bud. Bracts greenish-brown or purplish-brown, sometimes green at their rounded tip ; outer surface quite plane, shining with a polished appearance, inner surface much paler, almost white at base. Bracts lifting one at a time, but persisting for two or three days after the subtended flowers have dropped, so that there may be several open on the bud at one time ; firm in texture, scarcely revolute on fading, but first strongly reflexed and then deciduous.

Male flowers about 10–12 per bract in two rows ; compound tepal 3.5 cm. long, white or cream, the upper part and lobes slightly more yellow, the lobes about 3 mm. long with dorsal filiform appendage 1 mm. long, the accessory teeth nearly as long as the lobes and sometimes also appendaged ; free tepal about 2.5 cm. long, 1.5 cm. wide, translucent white, acute, scarcely apiculate ; stamens at length slightly exerted.

Fruit bunch horizontal, lax. Individual fruit 5–7 cm. long (including pedicel), about 2 cm. in diameter at the middle, oblong-ovate or ellipsoidal, obsoletely angled at maturity, narrowed at base into a stout pedicel 1–1.5 cm. long and abruptly at apex into a broad truncate acumen about 7 mm. long ; pericarp 1 mm. thick, ripening yellow ; pulp scanty, pale buff in colour.

Seeds numerous, subglobose-turbinate, very irregular in shape, usually higher than broad, about 2–3 mm. across and 3–4 mm. high, smooth.

M. textilis Née sensu Baker differs from most edible bananas and plantains, and from their closest wild relatives, quite fundamentally. It has a different chromosome number ($n = 10$) and typifies a group of species (§*Australimusa*) mostly Australasian, which all have this chromosome number and other characters in common. Their conspicuous characters are their highly polished and strongly imbricated bracts, often green or greenish in colour, and subglobose or dorsiventrally compressed smooth seeds. If any of these other than *M. textilis* itself occurs in the Philippines, it may have contributed to some strains of abacá, as we should expect species within the group to cross fairly readily, though we have not yet had the opportunity of studying hybrids. There are two groups of *Musa* species with 10 pairs of chromosomes, and with the other group (§*Callimusa*) *M. textilis* certainly crosses ; we have, for example, raised a hybrid between it and *M. borneensis* Becc.

With species of chromosome number $n = 11$, *M. textilis* crosses with difficulty, and apparently only when it is the male element, but we have raised hybrids between it and one form of *M. acuminata* Colla and also between it and *M. balbisiana* Colla. The latter hybrid is of particular interest.

N. B. Mendiola in his *Manual of plant breeding for the tropics* (Manila, 1926) states under the heading of abacá improvement that :

“There are two supposedly abaca-banana hybrids the fiber of which is about intermediate in strength between the banana and the abaca and is used in the adulteration of abaca. These hybrids are the Canton and Pacol. Canton is grown on a much larger scale than the Pacol and the use of its fiber in adulterating abaca has caused much injury to the abaca trade.”

In the Kew Herbarium there are photographs of bunches of fruit of *abacá*, *canton*, and *pacol*, accompanied by notes by E. D. Merrill dated 1.2.22. Merrill's notes say : “*Abacá* is, of course, *M. textilis*. *Pacol* is a very distinct species and is, I think, the form described by Blanco as *Musa trogloditarum* var. *errans* (= *Musa errans* (Blanco) Teodoro). *Canton* seems to me to be pretty clearly a natural hybrid between *abaca* and *pacol*. While *abaca* and *pacol* fruits are always filled with pulp and seeds, all the fruits of *canton* that I have seen present empty cells with no pulp and no seeds.”

Merrill is undoubtedly right. The *pacol* of these photographs is a form of *M. balbisiana* Colla, of which we have two clones from the Philippines in the I.C.T.A. collection, one received as "*Musa errans* Blanco. Variety Butuhan". The *canton* resembles our artificially raised *M. balbisiana* \times *M. textilis* hybrid. The failure to produce seeds is easily understood in the light of the difference in chromosome number of the parents, and no pulp is formed because neither parent had parthenocarpic fruits.

We thus have definite evidence that the ubiquitous *M. balbisiana* is mixed up among the textile *Musas* of the Philippines, though apparently not now recognized as true *abacá*. If the distinction has been less carefully drawn in the past, several things may be explained by the confusion of *M. balbisiana* with *M. textilis*. We have in the first place a likely explanation of how plants of *M. balbisiana* came to be labelled "*M. textilis*" in the Botanic Gardens of Buitenzorg and Rio de Janeiro, and why some descriptions of "*M. textilis*" in the literature do not fit the species as we understand it.

We may also have here a key to the two varieties of "*Musa silvestris*" of Rumphius, which many botanists have tried to identify with *M. textilis*. The variety *Mindanauensis* (later taken up by Miquel in 1855 as *Musa mindanensis*) was "a great and high tree, in thickness like a coconut and in height like a sugar-palm, usually black on the outside but one kind is green or whitish like other Musae, but is not so good . . . the fruits of this are like Pisang Batu, but smaller, never ripening or turning yellow, hard, filled with very many seeds . . ." I have very little doubt that Rumphius had in mind a variety of *M. balbisiana*, another and larger-fruited form of which he had already described as *Pissang Batu*. The variety *amboinensis* on the other hand may well have been *M. textilis* as many suppose. The fact that Rumphius put the two together is no indication at all that they were necessarily conspecific. Nor, it may be added, can we be sure that the "black" and "whitish" forms mentioned under *mindanauensis* were conspecific: it is the "green or whitish" kind that suggests *M. balbisiana* to me, but for the rest I cannot pretend to be able to interpret Rumphius.

Musa abaca Perrottet in Mem. Soc. Linn. Paris 3, 130 (1825) is commonly listed as a synonym of *M. textilis* and may be briefly discussed here. M. Samuel Perrottet was botanist with a French scientific mission under Captain Philibert which visited the East in 1819-20 with two ships, the "Durance" and the "Rhone". The name occurs in his "Catalogue Raisonné des plantes introduites dans les colonies françaises de Mascareigne et de Cayenne, et de celles rapportées vivantes des mers d'Asie et de la Guyane au Jardin des plantes de Paris" in Mém. Soc. Linn. Paris, 3, 1825. pp. 89-151.

The "description" (of which a full translation is given by Copeland *loc. cit.*) is non-technical, and the essential part of it is simply this:

"Elle diffère de ses congénères par des feuilles plus allongées, moins larges, plus fermes et d'un beau vert noir, par la grosseur et l'élévation considérables de sa hampe d'une couleur vert foncé brillant. Son fruit ne paraît jamais bien noué. On extrait de sa hampe une espèce de fibre de la plus grande tenacité"

Copeland's comment is :

"There is nothing in this, beyond large size and green stem, which might suggest any particular plant (for the leaf characters are those of 'abacá' in general), and these features are not those of *M. textilis*. There is no note of place of collection, within the Philippines, nor does it appear that the plant was collected. The account is probably no more than a traveller's general impression. Under the circumstances, the best that can be done with *Musa abaca* is to relegate it to the limbo of 'species ignota', though the name may be given to one of the tall, green forms, if study shows one of these to be entitled to recognition as a species".

There is a slight correction to be made to Copeland's comments. It does appear that the plant was collected, and not only collected but taken to Cayenne and Mascareigne (Réunion Is.). This is indicated by the latters C.M. appended to the description and explained in a footnote on p. 95 of the original article cited, which runs : "Je terminerai chacun des articles par les lettres C, M, P, selon que les plantes existeront, de mon fait, à Cayenne, à Mascareigne ou au Jardin des plantes de Paris ; les articles qui ne présenteront point l'une de ces lettres se trouve aux trois endroits". Thus, if a plant survives either in Réunion or in Cayenne which can be authentically traced back to Perrottet's introduction, the identity of *M. abaca* can be fixed. That is, however, a slender hope, for it is extremely unlikely that the necessary records survive, even if the plant does. The position will almost certainly have been confused by later introductions of *M. textilis*, and to prove the identity of any surviving plant with an introduction of more than a hundred years ago would appear on the face of it impossible in ordinary circumstances.

It also occurs to me that from Perrottet's remark that the fruit "never seems well fastened" we might hazard a guess that his plant was *canton* or some similar hybrid. There is, however, little profit in speculation. *M. abaca* was most probably either *M. textilis*, *M. balbisiana*, or a hybrid, and whichever it was the binomial can have no nomenclatural significance or validity. Copeland's "limbo of *species ignotae*" seems exactly the place for it.

ON THE FLORA OF KUWEIT : I.

B. L. BURTT AND P. LEWIS.

INTRODUCTION.

Arabia, which has inspired so much great literature, has curiously failed to evoke more than a mediocre account of its flora. Many travellers have gathered fragments of its vegetation for the museums of Europe ; many are their books which include lists of the plants identified ; yet it remains true to say that the composition of the flora of Arabia has received little detailed study. At present the standard work is the *Flora Arabica* of Rev. Ethelbert Blatter, published between 1919 and 1936 (2)*; but for all its great value as a handy work of reference, this is a diligently compiled catalogue rather than the record of a scientific investigation. More recently, in 1939, O. Schwartz published his *Flora des tropischen Arabiens* 10. This study included much new material, especially from the Yemen and the Hadhramaut, but it is open to criticism on the same grounds : identifications of earlier writers are uncritically accepted and their errors perpetuated.

Mrs. H. R. P. Dickson, M.B.E., first sent herbarium specimens from Kuwait to Kew in 1933, and she has now presented a total of nearly 600 numbers, including some from neighbouring parts of Saudi Arabia. As a result of determinations made at Kew by the late Mr. A. R. Horwood, Mrs. Dickson has already published a skeleton list of Kuwait plants (8), but it has been realised that some of the identifications need confirmation and that the value of the collections merits a more extended treatment. Although it primarily concerns only a small marginal area of the vast Arabian peninsula it is hoped that this enumeration will form a concrete addition to the taxonomy of the flora of Arabia.

Blatter divides Arabia into 4 geographical areas :—

- I. The Extra-tropical West,
- II. The Tropical West,
- III. The Tropical East,
- IV. The Extra-tropical East,

but these are in the nature of preliminary and arbitrary divisions, and II and III are actually divided from I and IV by a line drawn rigidly along the Tropic of Cancer ; thus they are not phytogeographical areas based on the distribution of species.

The shakdom of Kuwait which, including the neutral zone to the south-east, occupies an area of some 10,000 square miles, lies at the northeast corner of Blatter's area IV, The Extra-tropical East. It is particularly unfortunate that Blatter drew the southern boundary of this area right along the line of the tropic, for thus drawn it runs eastward to Oman and actually bisects that territory just south of Muscat. It would have been far preferable if, from a point on the tropic at 52° E. the boundary had been turned due north to the Persian Gulf. This would have made Area IV fairly homogeneous and would have left the whole of Oman (with its

*Numbers in parenthesis refer to the list of papers at the end of the Introduction.

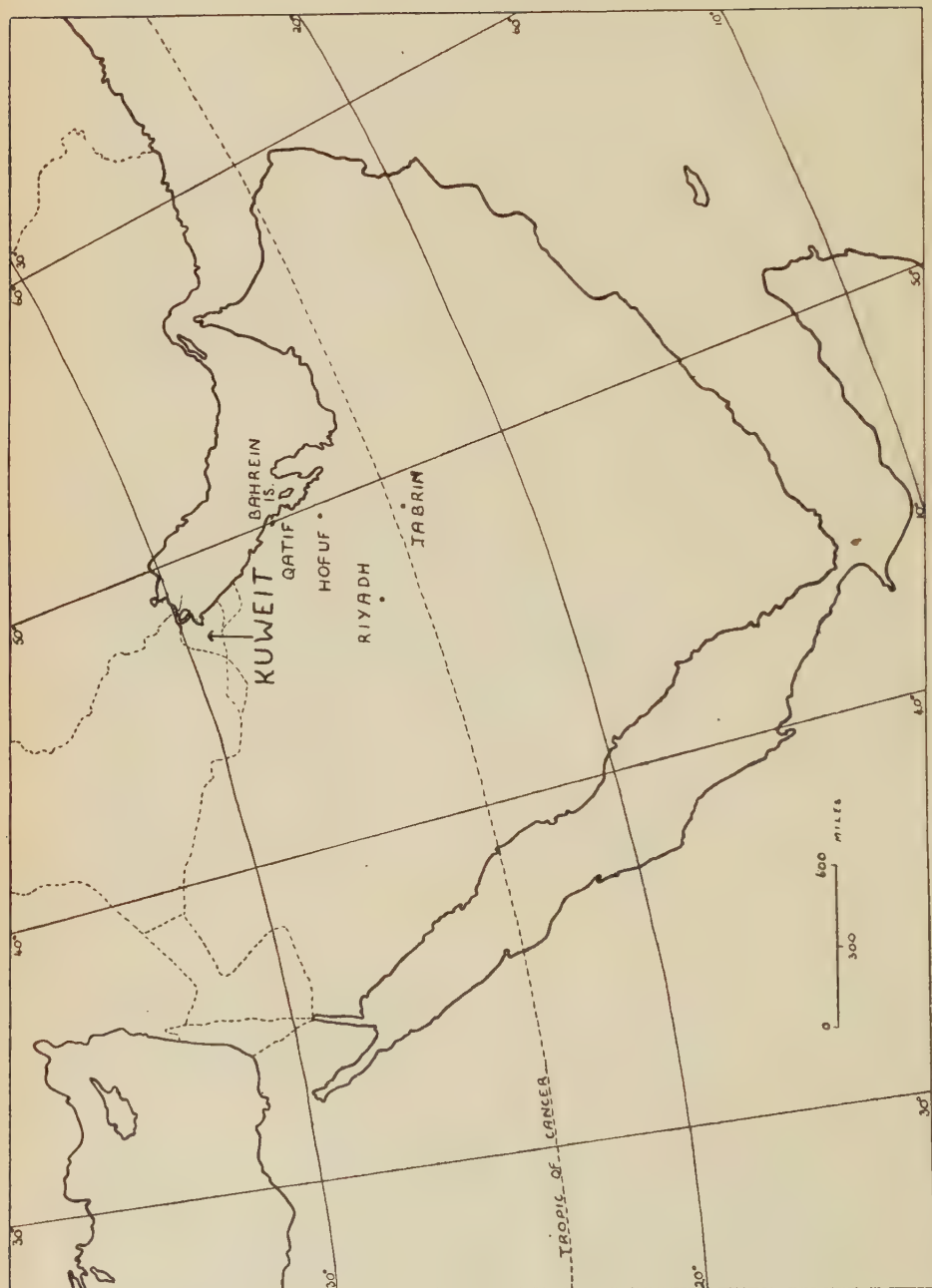


FIG. 1. Map to show position of the Shaikhdom of Kuwait relative to the rest of Arabia. A few of the Arabian localities cited are shown. (Scale = 1 : 22,000,000).



FIG. 2. Map of the Shaikhdom of Kuwait. (Scale = 1 : 2,000,000).

stronger Indian and tropical floristic elements) in a separate geographical division.

Boissier (3) saw no specimens from Kuwait and the earliest botanical collection is believed to be that made by Lt. Col. (later Sir) Lewis Pelly who travelled from Kuwait to Riyadh and back to the Persian Gulf near Bahrein Island in February–March 1865 (9). Identifications of the plants collected on this journey were not published at the time, but the specimens, 60 in number, are preserved in the Kew Herbarium. They were cited by Blatter, but he often failed to particularise the locality, which can be obtained for dated specimens by comparison with the published map on which is marked both the route and the date at which each point was reached. It has therefore seemed desirable to include them again in the present enumeration.

The only other collection known from Kuwait was made by Sir Percy Cox and Lt.-Col. S. G. Knox in the Zor Hills about 1907 and was finally

published by H. Gilbert Carter some 10 years later (6). This collection included about 100 specimens, but not all of these are now extant. However Dr. K. Biswas, Director of the Botanical Garden, Calcutta, has kindly sent such as could be found on loan to Kew, and these will be included in the present study.

For the whole of Area IV, except Muscat, Blatter's records are based on the collections of Pelly and Cox, with a very few additions from Bornmüller's (4, 5) collectings on Bahrein Island. The Muscat records are attributable largely to Aucher-Eloy and in lesser degree to Last, Pilgrim and Bornmüller (4, 5), though some of the discoveries of the last-named are unaccountably omitted (e.g. *Herniaria maskatensis* Bornm.). Large collections have been made on Bahrein Island by Joseph Fernandez but they have not been published. Some of the specimens are in the Kew Herbarium and will be quoted in the present paper when they are of particular interest.

The extensive journeys of the Austrian explorer Alois Musil do not appear to have actually carried him into Kuwait territory, but one area visited by him is of particular interest. This is Wadi Sirhan and the surrounding country (about 31° N., 38° E.—see sketch map in Geogr. Journ. 35 : 580. 1910), which is one of the few places on the line between Sinai and Kuwait where plants have been collected. Musil's specimens have been determined by Velenovsky (11) and an unexpected number of new species described by him, one of which, *Cakile arabica*, has so far been identified in Mrs. Dickson's Kuwait collections and is enumerated below.

Two other small collections from areas neighbouring to Kuwait may be mentioned. In 1926 Major R. E. Cheeseman (7) published an account of his travels from the coast of the Persian Gulf near Bahrein Island, southwest to Hofuf, the capital of the north coast province of El Hasa, and on to the oasis of Jabrin which lies just below the tropic and about longitude 49° E. The botanical specimens collected by him are in the British Museum Herbarium and a list of them by R. D'O. Good and C. Norman formed an appendix to his book. More recently M. Zohary (12) has listed some 110 plants found by Dr. Eig and himself in the southwest corner of Iraq, just outside the Kuwait border.

Finally R. A. Blakelock (1) is now publishing a list of the large collections made for the Rustam Herbarium, Iraq, by E. R. Guest. This includes records from the S.W. desert areas which abut on the Kuwait, although this region is not very strongly represented in Guest's collections.

It is estimated that approximately 300 species will be listed from Kuwait and the islands pertaining to her, and perhaps another 50 from neighbouring parts of Saudi Arabia. The value of Mrs. Dickson's collections can be appreciated when it is realised that Blatter's records from Area IV as a whole only total about 270, and that a very large number of these are Muscat plants which we cannot expect to occur in the immediate neighbourhood of Kuwait.

In the subsequent enumeration the families follow in the main the sequence of Bentham and Hooker's *Genera Plantarum* but certain

generally accepted modifications, such as the bringing together of the *Centrospermae*, have been made. The genera and species are arranged alphabetically. For each species the original reference is given together with such later references and synonymy as appear desirable : no attempt has been made to make the synonymy complete.

In an effort to avoid those misidentifications which so easily intrude into an enumeration of this sort, the type of each species has been indicated under a special heading. This innovation has forced the authors to apply the type-concept rigorously throughout and has already yielded good dividends by bringing to light earlier misidentifications. The whereabouts of the type specimen is indicated, and personal inspection is denoted by a mark of exclamation (!). Where we have seen only a duplicate of the type this is shown by the citation of the herbarium* where the type itself is believed to be housed, followed by the herbarium where the duplicate has been seen. Thus " Delile (P, K !)" would mean that Delile's type is at Paris but that we have seen a duplicate in the Kew Herbarium. " Forskal (C !)" would show that we had actually seen Forskal's type and would imply that it had been sent on loan to Kew by the Director of the Botanical Museum, Copenhagen. Full acknowledgments for help received can only be given when the work is complete, but we would even now extend our thanks to those who have already sent us specimens on loan.

In the case of some of the older species, especially those described by Linnaeus, it is no simple matter to decide which of the original elements is to be taken as the lectotype. Often the selection has seemed to be outside the scope of our studies (for example in the widespread species of *Brassica*) and then we have been content to indicate this. In other cases in which we have wished to select a lectotype we have only been able to examine part of the original specimens, and that often in duplicate material only : we have therefore used the phrase 'provisional lectotype' to indicate our choice.

The Kuwait and other specimens on which the enumeration is based are cited in full, together with the collector's notes. Arabic names are included in these notes (printed in italics) in the form written by the collector and an index of them will be given at the end of the enumeration. The authors are, however, quite incompetent to attempt the correlation of these names with those given by Schweinfurth and others. The difficulties and variations of transliteration require the abilities of an Arabic scholar rather than a botanist. The orthography of place names has likewise proved a difficult problem. The spelling of "Kuwait" has been adopted in preference to "Koweit" or "Kuwait" on the recommendation of the Permanent Committee on Geographical Names for British Official Use (Second List of Names in Arabia : 1937), and other names are in accordance where possible with the same authority.

The citation of the Arabian specimens is followed by an outline of the distribution of the species in general terms as it is represented in the Kew

*The following abbreviations are used :—

B.=Berlin.
BM.=British Museum (Nat. Hist.).
C.=Copenhagen.
F.=Florence.

G.=Geneva.
K.=Kew.
Linn.=Linnean Society of London.
P.=Paris.

Herbarium : we have not taken account of published records as the accuracy of identification is too often open to doubt. The shifting of political boundaries is one of the major difficulties in citing plant distributions. One particular instance of this has troubled us : some of the older collectors localised their specimens with cheerful vagueness "Arabia Petraea", an area which apparently covered not only the country in the immediate neighbourhood of the ruined city of Petra (now within the boundaries of Transjordan), but also the peninsula of Sinai on the one side and the north-western region of Saudi Arabia on the other. At times we have been forced to repeat the citation "Arabia Petraea" without further particularisation, but where possible we have cited specimens according to modern boundaries, mentioning, however, Sinai as a separate entity. The inclusion of Arabia in the distribution list indicates that there are Arabian specimens at Kew in addition to Mrs. Dickson's or others cited in full.

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PTERIDOPHYTA (by F. BALLARD)

OPHIOGLOSSACEAE

1. **Ophioglossum aitchisoni** (C. B. Cl.) d'Almeida in *Journ. Ind. Bot. Soc.* 3: 63, fig. 12 (1922).

O. vulgatum L. var. *aitchisoni* C. B. Cl. in *Trans. Linn. Soc. Bot. Ser.* 2, 1: 586 (1880).

Type. Punjab, Rawalpindi; 720 m.; Mar. 1872, *Aitchison* 1128 (K!).

KUWEIT. Arafjan; March 1933, *Dickson* 104. Arafjan; on stony ridges bare of most other plants; children sometimes eat it; 5 Jan. 1935, *Dickson* 150. Failaka Is.; 1936, *Dickson* 104A.

ARABIA. Dhahran; on sandy ground at foot of small hill; 60 m.; 3 Apr. 1942, *Dickson* 482. Bahrein Is.; Jebel Dukhan; in sand, on stony plain on eastern side; 23 Feb. 1936, *Fernandez* 346. Bahrein Is.; bed of dry shallow watercourse below Jebel Dukhan; 27 Feb. 1936, *Fernandez* 486. Without locality; 1865, *Pelly*.

Distribution. Punjab, Afghanistan, Abyssinia (?).

A small plant of stony and sandy places; characterised by the presence of numerous persistent bases of old fronds at the apex of the rhizome. A somewhat similar plant found in Southwest Africa may prove to be conspecific.

POLYPODIACEAE

2. **Adiantum capillus-veneris** L. *Sp. Pl.* 2: 1096 (1753).

Type. Not precisely designated.

ARABIA. Hofuf; gardens on way to Jebel Qara; edge of fresh water streams on edge of gardens; clay soil; 23 Mar. 1947, *Dickson* 539.

Distribution. Widely spread through tropics and subtropics, extending northward to Britain.

GYMNOSPERMAE

GNETACEAE

3. **Ephedra alata** Decne. in *Ann. Sci. Nat. Sér.* 2, 2: 239 (1834); Stapf, *Die Arten der Gattung Ephedra*, 36, t.1 (1889).

Type. Desert near Suez; Jun. 1832, *Bové* 215 (P, K!).

KUWEIT. Between Safwan and Zubair (Iraq); sea level; *allandar*; sandy ground near salty patch; a bush of 2-3 ft. high with clusters of

yellow flowers round the stem, these were obviously male flowers, the female being all green on another bush the same size ; 16 Mar. 1940, *Dickson* 458.

ARABIA. Between Abqek and Hasa, about 100 km. from Dhahran ; sandy country with limestone hills in vicinity ; green bush about 3 ft. high with clusters of yellow flowers around stems, similar bush about 3 ft. away with buds, obviously female plant ; 23 Mar. 1947, *Dickson* 525.

Distribution. Morocco, Algeria, Egypt, Sinai, Transjordan, Iraq.

The record for Iraq comes from a collection made by Guest, Eig and Zohary in the region just north of Kuwait between Zubair and Ur, but the specimens in the Kew Herbarium are male only. The Kuwait and Arabian materials give a new south-easterly extension of the specific range.

Stapf divided the species into two varieties and investigation has shown that the Kuwait specimens should probably be referred to his var. *α. decaisnei*, although some very small differences from this have been noted. The bracts of both the male and female inflorescence are very similar in shape and size, although material from Egypt often shows those of the female to be almost orbicular and not attenuated at the base as in the Kuwait specimens. In the male flower of the latter the antherophore bears 4-7 irregularly arranged stipitate anthers, the free part being generally about 1 mm. long. The Egyptian and Sinai material in the Kew Herbarium shows a range from shortly stipitate anthers to those with the free part of the antherophore similar to that in Mrs. Dickson's plant.

The size and form of the female flowers is very similar to var. *decaisnei* except for the fact that the outer woody envelope around the nucellus is divided at its tip into three small teeth corresponding to the ridges of the envelope. These teeth do not appear to be present in var. *decaisnei* although the rim of the aperture is irregular, due to the ridges of the woody envelope. The form of the inner envelope which projects above the outer, is similar in both cases, being straight and of equal diameter throughout.

The presence of teeth at the tip of the outer envelope is characteristic of Stapf's var. *alenda* (l.c. ; *E. alenda* (Stapf) Andr. in Engl. Bot. Jahrb. 64 : 262. 1931), which comprises the material from Morocco and Algeria, but this is otherwise distinct in having a much more elongate fruit, much larger and more frilly female bracts, and a smaller male flower with sessile anthers. It appears therefore that although the Kuwait material shows some slight variation from that of Egypt and Sinai, it is not as distinct as the western var. *alenda* and does not itself deserve varietal rank.

ANGIOSPERMAE : DICOTYLEDONES.

PAPAVERACEAE

4. *Papaver macrostomum* Boiss. et Huet ex Boiss. Fl. Or. 1 : 115 (1867) ; Fedde in Pflanzenreich, Papaver. 335 (1909) ; Turrill in Bot. Mag. t. 9226 (1930).

Type. Armenia, near Tortum ; June 1853, *Huet du Pavillon* (G—not seen).

KUWEIT. Adaliyeh ; growing amongst corn crops ; never before seen here by me and possibly imported with wheat seed from Iraq ; scarlet poppy about 6 ins. high with hairy stems and leaves and black markings in centre of flower ; 8 April 1935, *Dickson* 188.

Distribution. Asia Minor, Armenia, Iraq, Persia.

This specimen has strongly spreading setae on the peduncle, which would exclude it from *P. macrostomum* in Fedde's key, but Turrill has pointed out the occurrence of both spreading and appressed setae in the same collection, and this is a character which is known to vary, for example, in *P. rhoeas* L. The three new species which Fedde diagnosed as having spreading setae, *P. dalechianum*, *P. kurdistanicum* and *P. divergens* are all very incompletely known and it is not impossible that they will eventually be included in a more broadly defined *P. macrostomum*. We therefore prefer to use this, the oldest, name for our plant.

The Kuwait collection is the first record of this species from Arabia and represents the most southerly point of its range.

5. *Papaver somniferum* L. var. *leptocaulotum* Fedde in Pflanzenreich, Papaver. 342, fig. 37 C (1909).

Type (of var.). Armenia, Keban Maaden ; 21 June 1889, *Sintenis* 836 (B, K !).

KUWEIT. Adaliyeh-Kuweit ; in corn crops just outside the town ; never before seen in Kuwait and possibly imported with grain from Iraq ; a tall white poppy, 12 ins. high, with smooth leaves ; 8 April 1935, *Dickson* 189. Adaliyeh ; amongst crops of wheat ; a poppy with smooth leaves and crimson flowers with deep purple markings in the centre, 12 ins. high ; 8 April 1935, *Dickson* 190.

Distribution (of var.). Armenia, Persia.

Of the four specimens cited by Fedde under this variety *Sintenis* 836, of which there is a duplicate at Kew, is here selected as provisional lectotype.

6. *Roemeria hybrida* (L.) DC. Syst. Veg. 2 : 92 (1821) ; Fedde in Pflanzenreich, Papaver. 239 (1909).

Chelidonium hybridum L. Sp. Pl. 1 : 506 (1753).

Type. Not precisely designated. Accepted in sense of Fedde (l.c.).

KUWEIT. Arafjan ; sand dunes near the sea ; *bahkatari* ; a purple-flowered poppy ; 28 Feb. 1935, *Dickson* 227. Failaka Island ; 1936, *Dickson* 227A.

Distribution. Widespread from Western Europe to Afghanistan.

The specimen (Cox 65) on which Carter's record of *Papaver hybridum* L. is based has now lost its one flower ; from the vegetative characters, however, it seems more probable that the specimen belongs to *Roemeria hybrida*.

7. *Roemeria hybrida* (L.) DC. subsp. *dodecandra* (Forsk.) Maire in Jahand. & Maire, Cat. Pl. Maroc. 2 : 257 (1932).

Chelidonium dodecandrum Forsk. Fl. Aeg.-Arab. 100 (1775).

Roemeria dodecandra (Forsk.) Stapf in Denkschr. Akad. Wien, 51 : 295 (1886) ; Fedde in Pflanzenreich, Papaver. 242 (1909).

Type. Egypt, desert near Cairo ; *Forskal* (C—not seen).

KUWAIT. Failaka Island ; among corn crops and on fallow ground ; purple poppy with long seed pods ; 23 March 1938, *Dickson* 424.

Distribution (of subsp.). Morocco, Libya, Egypt, Sinai, Palestine, Syria, Transjordan, Iraq, Persia, Afghanistan, Baluchistan.

R. hybrida and *R. dodecandra* have been kept as distinct species by Fedde, the chief distinguishing characters being the linear leaf-lobes of *R. hybrida* and the ovate ones of *R. dodecandra*. At present, however, we prefer to follow Maire's lead of classifying *R. dodecandra* as a subspecies of *R. hybrida*, as in the area where *dodecandra* types occur intermediate forms, which it is very difficult to assign decisively to one unit or the other, are also found.

Typical European *R. hybrida* has the pod bristly towards the apex. In Fedde's account the variety of *R. hybrida* with bristles over the whole length of the pod is called var. *eriocarpa* DC., but it is clear from De Candolle's original publication (Syst. Veg. 2 : 92. 1821, that this name belongs to subsp. *dodecandra*.

The naming of these indumentum forms seems profitless. We have observed in the Kew Herbarium 3 main types :—(a) bristles towards the apex of the pod, (b) bristles over the whole length, (c) bristles and short hairs present. All 3 types occur in *R. hybrida* proper and the two last in subsp. *dodecandra*. In the Kew herbarium none of the specimens from Europe or North Africa shows the double indumentum of bristles and short hairs, but the material from the Orient, both of *R. hybrida* and of subsp. *dodecandra*, shows a percentage of plants with this character. Such are specimens of *R. hybrida* from Egypt, Transjordan and Persia. Generally the short hairs of the indumentum are in distinct rows along the length of the pod, but occasionally they are scattered freely amongst the bristles.

FUMARIACEAE

8. *Fumaria parviflora* Lam. Encycl. 2 : 567 (1786) ; Pugsley in Journ. Linn. Soc. Bot. 44 : 322 (1919).

Type. Cult. in Jard. Bot. Paris from C. France (*Lamarck* : not seen). The "form regarded as the specific type" is diagnosed by Pugsley (l.c.).

KUWAIT. Failaka Island ; small bushy plant with pinky white flowers resembling fumitory (A) and with white flowers and more bushy (B) ; 24 March 1936, *Dickson* 284A, 284B.

Distribution. Widespread from W. Europe to India.

These specimens are probably referable to var. *latisetia* Hausskn., but the varietal distinctions in this species are scarcely convincing.

9. *Hypecoum pendulum* L. var. ***persicum*** Fedde in Pflanzenreich, Papaver. 96 (1909).

Type (of var.). Persia, Ispahan ; *Aucher-Eloy* 4043 (Leningrad, K!).

KUWAIT. Arafjan ; *al kashaim* ; sandy ground ; Mar. 1933, *Dickson* 102.

Distribution (of var.). Persia.

The species ranges from the Iberian Peninsula to Central Asia and is no less variable than would be expected. The variety *persicum*, described from a single specimen, cannot yet be said to be firmly established as a taxonomic entity, but the short leaf-lobes are distinctive and suggest that further, more adequate, material would confirm its status.

CRUCIFERAE

The genera of this family have been accepted with the limits defined by O. E. Schulz (in Engler & Prantl, *Natürl. Pflanzenfam.* ed. 2, 17B. 1936).

10. *Alyssum homalocarpum* (Fisch. et Mey.) Boiss. *Fl. Or.* 1 : 285 (1867).

Psilonema homalocarpum Fisch. & Mey. *Ind. Sem. Hort. Petrop.* 6 : 63 (1839).

Type. Cultivated in Hortus Petropolitanus from seed collected by Schimper in Arabia Petraea (Leningrad—not seen).

KUWEIT. Batin-Mahazul, 100 miles west of Kuwait ; 120 m. ; slopes of Batin and in dry water courses ; small plant with numerous circular fruits on single stems, and small white flowers ; 17 Mar. 1946, *Dickson* 511.

Distribution. Egypt, "Arabia Petraea".

There is a specimen at Kew (herb. J. Gay) which was cultivated at Paris from Schimper's Arabian seed and is therefore presumably of the same origin as the type. The Kuwait collection is a new and easternmost record for *A. homalocarpum*. The species has been recorded for Trans-jordan (Maan and Iraq 400 km. W. of Bagdad) by Zohary (*Pal. Journ. Bot. J. series*, 2 : 162. 1941), but these specimens have not been seen by us.

11. *Anastatica hierochuntica* L. *Sp. Pl.* 641 (1753).

Type. Not precisely designated.

KUWEIT. Huffafat Hill near Araq wells 80 miles S. of Kuwait ; 135 m. ; *kaff al adhra* ; growing on stony top of hill, furthestmost north that I have found this plant ; plants were small and not to be compared with others found 24 miles further south ; 4 Apr. 1947, *Dickson* 542.

ARABIA. Abraj al Khalija 120 miles S.W. of Kuwait town ; 30 m. ; *al kafta* ; growing in vicinity and on edge of "sink" on dry hard ground ; small flat plant with green flowers ; when dry its leaves curl up and inwards forming a hard "ball" ; 12 May 1943, *Dickson* 499. Bid-jidiyeh, N. side of Wadi Sahabah, 15 kms. E. of Yemmama ; *kafta* or *kaffa mariam* ; dry pebbly places ; 9 Feb. 1944, *Barger* (*Dickson* 502). Abraj al Khalija, 104 miles south of Kuwait ; 90 m. ; *kaff al adhra* ; growing at bottom of "sink" where recent rain had fallen ; in this vicinity, on the edge of what had been lakelets, the hard ground was covered with plants both dry and green ; 6 Apr. 1947, *Dickson* 543.

Distribution. Morocco, Algeria, Egypt, Sudan, Sinai, Palestine, Arabia, S. Persia.

The spelling *hierocuntica*, which was originally used by Linnaeus, is accepted as an unintentional error as it was corrected to *hierochuntica* in the second edition of *Species Plantarum*.

The arabic names of this plant mean the Virgin's Hand or the Hand of Mary ; it is surrounded by folk legends and is especially used by women as a charm at childbirth. Mrs. Dickson (no. 499) records that the plant is soaked in water and when it has unfurled the water is drunk by the expectant mother : on this occasion the collector gave the Murra name *al kafta*. On another occasion (no. 502) she records that in Karaj the story goes that the Virgin Mary when she was in labour clutched the plants in her hands and held them tight, and that is why they close up like a hand when dry. For a fuller account see Crowfoot and Baldensperger, *From Cedar to Hyssop*, 119 (1932).

It may be recorded that seeds of this species removed from *Dickson* 502, collected in 1944, germinated freely and rapidly when sown at Kew in the spring of 1948. The fruits remain firmly closed when the plant is dry, and the fruit valves will then withstand considerable tension ; when moisture has been absorbed, however, the valves come away at the slightest touch.

12. *Brassica campestris* L. Sp. Pl. 666 (1753) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 45 (1919).

Type. Not precisely designated.

KUWEIT. West of Shugg, 60 miles west of Kuwait ; 180 m. ; in vicinity of water well no. 13 K.O.C., in *hamdh* growing country ; one single branched plant, 2 ft. high, flowers yellow, stems smooth with arrow shaped leaves at each branch of stem and the lower two or three leaves serrated ; 24 Feb. 1945, *Dickson* 504.

Distribution. Widespread throughout the temperate regions of the world.

13. *Brassica deflexa* Boiss. in Ann. Sci. Nat. sér. 2, 17 : 87 (1842) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 63 (1919).

B. tigridis Boiss. l.c.

B. deflexa Boiss. var. *tigridis* (Boiss.) Boiss. Fl. Or. 1 : 393 (1867).

Type. Aleppo ; *Aucher* 229 (G, K!).

KUWEIT. Kuwait ; sea level ; growing amongst corn and barley crops ; height $1\frac{1}{2}$ –2 ft., flowers yellow, leaves slightly hairy ; 15 March 1935, *Dickson* 179. Failaka Island ; sea level ; among corn crops ; flowers yellow, leaves slightly hairy, seed pods long and thin, height $1\frac{1}{2}$ –2 ft. ; 21 Mar. 1938, *Dickson* 407.

Distribution. Syria, Iraq & Persia.

There are two sheets numbered *Aucher* 229 in the Kew herbarium ; one of these is almost leafless, the other has the radical leaves and lower part of the stem very strongly hispid. In that respect it does not agree with Boissier's original description, and we are therefore uncertain as to the precise form represented by the type of the species. *Aucher* 227 is the type number of *B. tigridis* Boiss. and this is also represented at Kew and the specimens agree well with *Dickson* 179 from Kuwait. Boissier himself eventually reduced *B. tigridis* to a variety of *B. deflexa* and Schulz has accepted it as a synonym without even varietal rank.

This collection is apparently the first record of the species from Arabia.

14. *Brassica juncea* (L.) Coss. in Bull. Soc. Bot. Fr. 6 : 609 (1859) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 55 (1919).

Sinapis juncea L. Sp. Pl. 668 (1753).

Type. Not precisely designated.

KUWEIT. Huwelli ; sea level ; in uncultivated garden ; yellow flowers, leaves serrated, stalk smooth ; 22 Feb. 1945, *Dickson* 503.

Distribution. Widespread as a weed throughout the world.

Although *B. juncea* is so widespread there are in Kew herbarium a number of areas, such as most of the countries around the Mediterranean, which are not represented. There are also many more larger areas where the species shows only sparse distribution.

15. *Brassica tournefortii* Gouan. Ill. Obs. Bot. 44, tab. 20, fig. A (1773) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 67 (1919).

Sinapis chinensis L. Mant. prim. 95 (1767)—non *Brassica chinensis* L.

Type. Cult. at Montpellier (not seen).

KUWEIT. Arafjan ; sea level ; *harraisha* ; sandy soil, very common ; a tall branched stem 3-4 ft. high with very small pale yellow flowers, its many jagged leaves forming a circle at the base ; eaten by camels ; 28 Feb. 1935, *Dickson* 172. Kuweit ; sea level ; rubbish heaps inside walls ; a tall branched plant with 4 petalled yellow flowers and long seed pods, the leaves growing in a circle around the base of the plant ; 12 Mar. 1936, *Dickson* 280.

Distribution. Widespread around the borders of the Mediterranean and eastwards to N.W. India.

In 1903 O. E. Schulz in Urban, Symbolae Antillanae, 3 : 511) described *Brassica urbaniana*, which he based on two subsontaneous West Indian plants (*Eggers* 5141 and *Buch* 661) and quoted as a synonym of it *Sinapis chinensis* L., remarking that his plants agreed well with Arduini's illustration (Animadv. bot. specimen, 23, t. 10. 1759) which Linnaeus cited. This however is not so. The type specimen of *S. chinensis* in the Linnean herbarium and Arduini's illustration are both clearly *Brassica tournefortii*. In fact Schulz later (Pflanzenreich, Crucif.—Brassic. 1 : 67. 1919) rightly cited Arduini's plant under *B. tournefortii* though he incomprehensibly left the Linnean name *S. chinensis* under *B. urbaniana*. The latter species, as typified by *Eggers* 5141, is certainly very close to *B. juncea* (L.) Coss. and perhaps scarcely distinct.

16. *Cakile arabica* Velen. et Bornm. in Fedde Rep. 9 : 114 (1911) ; Schulz in Pflanzenreich, Crucif.-Brassic. 2 : 28 (1923).

Type. Central Arabia, Nafud, Slih ; 1909, *Musil* (not seen).

KUWEIT. Arafjan ; *seliyh* ; flowers pale mauve ; Mar. 1933, *Dickson* 27 bis, 139. Fanaitis ; near wells ; 20 Feb. 1935, *Dickson* 27A [part].

ARABIA. On road to Hofuf S.W. of Abqek oil field ; sandy ground where early rain had fallen ; plant 10 ins. high with mauve flowers and long seed pods ; 23 Mar. 1947, *Dickson* 530.

Distribution. Central Arabia, Iraq.*.

For note on the Arabic name see under *Erucaria hispanica*.

17. *Carrichtera annua* (L.) Aschers. in Ind. Sem. Hort. Bot. Berol. 13 (1866) [not seen] ; Aschers. & Schweinf. Illust. Fl. Egypte, 42 (1887) ; Schulz in Pflanzenreich, Crucif.-Brassic. 2 : 41 (1923).

Vella annua L. Sp. Pl. 641 (1753).

Carrichtera vellae DC. Syst. Veg. 2 : 642 (1821).

Type. Not precisely designated.

KUWEIT. 10 miles south of Kuwait ; *al nefagh* ; Mar. 1933, *Dickson* 26 ; 1935, *Dickson* 26A. Zor Hills ; *Cox* 30.

Distribution. Canary Islands, Portugal & Spain, Balearic Islands, Corsica, Sardinia & Sicily ; Greece ; southern shores of Mediterranean to Palestine & Syria, Iraq & S.W. Persia.

Recorded by Blatter from Sinai but the Fox specimen quoted by him is *Didesmus bipinnatus* DC. ; Post's plants also from Sinai and quoted by Blatter have not been seen by us. Schulz records the species from Sinai on the basis of specimens collected by Ascherson.

18. *Diplotaxis acris* (Forsk.) Boiss. Fl. Or. 1 : 389 (1867) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 150 (1919).

Hesperis acris Forsk. Fl. Aeg.-Arab. 118 (1775).

Type. Egypt, Cairo ; *Forsk.* (C—not seen).

KUWEIT. 60 miles S.W. of Kuwait ; 60 m. ; sandy ground ; annual herb with pale mauve four-petalled flowers and long upright seed pods $1\frac{1}{4}$ ins. long, leaves and flower stalks slightly hairy, main stem smooth ; 3 Mar. 1936, *Dickson* 273. Ash Shugg, 35 miles west of Kuwait ; 30 m. ; *khafsha* ; puffy ground bare of most plants ; compact plant of bright green leaves with smooth whitish succulent veins, flowers pale purple, stamens yellow, buds slightly woolly ; rare in Kuwait, common in the Hajara, west of Hafar al Batin ; 13 Mar. 1943, *Dickson* 273A.

ARABIA. Abraj al Khaliya, 100 miles south of Kuwait ; 30 m. ; growing on gypsum covered slope ; pale purple flowers ; eaten by camels ; 10 Jan. 1935, *Dickson* 156. Jauf Hill, 118 miles south of Kuwait town ; 150 m. ; growing on top of stony rocky hill, also in sandy water courses down sides, with Arfaj bushes ; tall smooth leaved plant with purple flowers and long seed pods, rather unpleasant smell ; 6 Apr. 1947, *Dickson* 552. 10 miles south of Araq wells (on south border of neutral zone) ; 15 m. ; in and on edge of sandy dry water course ; violet flowered plant $4\frac{1}{2}$ ins. high, with slightly hairy leaves, flower stalks and buds and with long thin seed pods, leaves only at base of plant ; 1 Feb. 1948, *Dickson* 565.

Distribution. Egypt, Sinai, "Arabia Petraea," Arabia.

19. *Diplotaxis harra* (Forsk.) Boiss. Fl. Or. 1 : 388 (1867) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 152 (1919).

*IRAQ. Jebel Samara ; 23 Aug. 1919, *G. A. Watson*. This is apparently the first record of *C. arabica* from Iraq.

Sinapis harra Forsk. Fl. Aeg.-Arab. 118 (1775).

Type. Egypt, Cairo ; *Forskal* (C—not seen).

KUWEIT. Above Kusur on Dhahar ; *al khashain* ? ; 120 m. ; gypsum covered hillocks ; a plant about 1 ft. high with yellow flowers and long thin seed pods, leaves serrated and slightly hairy ; very common in the Hajara 100 miles west of Kuwait ; 26 Mar. 1935, *Dickson* 186. Zor Hills ; 120 m. ; dry stony tops of the Zor ridge ; a bushy plant with hairy stems and leaves, heads of pale yellow flowers with four petals and long thin seed pods, flower heads much more compact than in No. 186 ; 22 Feb. 1936, *Dickson* 271.

Distribution. Morocco, Algeria, Tunis, Tripolitania, Egypt, Palestine, Syria, Arabia, Iraq, Persia.

20. *Eremobium aegyptiacum* (*Spreng.*) *Hochr.* in Ann. Conserv. & Jard. Bot. Genève, 7-8 : 159 (1904).

Malcolmia aegyptiaca Spreng. Syst. Veg. 2 : 898 (1825).

Type. Egypt, Pyramides ; *Sieber* as *Cheiranthus lividus* (? , K !).

ARABIA. Dubai ; loose sand ; plants with spreading growth and white flowers ; fodder for goats and sheep ; 4 May 1937, *Holmes* (*Dickson* 356 H). Dubai ; 10 Mar. 1937 (approx.) *Holmes* (*Dickson* 360 H). Dhahran ; 60 m. ; sandy slopes below Jebel ; plant with white flowers resembling sweet Alyssum, and long narrow seed pods ; 31 Mar. 1942, *Dickson* 471 A. Dhahran ; 105 m. ; slopes of hill below settlement ; flowers white, long seed pods ; 20 Mar. 1947, *Dickson* 523. Sandhills 85 miles E.N.E. of Riyadh ; 11 Mar. 1865, *Pelly*.

Distribution. Morocco, Algeria, Tunisia, Tripolitania, Egypt, Sinai, Palestine, Arabia.

The Arabian specimens seem to be of two varieties. *Dickson* 523 & 471A show small flowers 5 mm. long, slender glabrous pods 20 mm. long and narrow leaves, while 360 H & 356 H have larger flowers 7 mm. long, slender stellate hairy pods 20 mm. long, and slightly broader leaves.

Both Hochreutiner (l.c.) and Cosson (Ill. Fl. Atl. 1 : 22, t. 15, 16. 1882) subdivide *E. aegyptiacum* into three varieties, while Schulz (in Engl. & Prantl, Pflanzenfam. 17 B : 571. 1936) considers these as three separate species. There seems to be insufficient distinction between the three groups to separate them specifically, indeed it is sometimes difficult to definitely place a specimen under one of the named varieties. Thus the Arabian material, although it falls into two groups, shows combinations of characters which do not agree precisely with either of Cosson's varieties from the eastern range of the species. His illustrations show var. *lineare* with short, broad and sometimes glabrous pods, larger flowers and narrow leaves, while var. *aegyptiacum* has slender stellate-hairy pods, smaller flowers and broader leaves.

21. *Eruca sativa* Mill. Gard. Dict. ed. 8 (1768) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 181 (1919).

Type. Cult., *Miller* (BM ?—not seen).

KUWEIT. Kuwait ; sea level ; uncultivated gardens ; a tallish plant with creamy yellow flowers with purplish brown veins, smooth leaves,

hairy stem and long seed pods with hairs on sides ; 10 Mar. 1936, *Dickson* 275. Waliyeh-Kuweit ; sea level ; in corn crops ; mustard like plant with yellow flowers ; 1 Mar. 1937, *Dickson* 328. Failaka Island, Zaur ; sea level ; gardens in neglected areas under palms ; flowers cream, veined brownish mauve ; leaves smooth, seed pods smooth and pointed ; 21 Mar. 1938, *Dickson* 409.

Distribution. Widespread from western Mediterranean countries to N.W. India and China. Also in the Sahara, Sudan, and introduced into South Africa and in Central America.

Material of *Dickson* 275 has fruits with a few hairs down the sides approaching var. *eriocarpa* (Boiss.) Post.

22. *Erucaria hispanica* (L.) Druce in Rep. Bot. Exch. Cl. Brit. Isles, 1913, 418 (1914).

Sinapis hispanica L. Sp. Pl. 669 (1753).

Bunias myagroides L. Mant. prim. 96 (1767).

Erucaria aleppica Gaertn. Fruct. et Sem. 2 : 298 (1791).

E. boveana Coss. Ill. Fl. Atl. 1 : fasc. 2, 45 (1884) ; Schulz in Pflanzenreich, Crucif.-Brassic. 2 : 11 (1923).

E. lineariloba Boiss. in Ann. Sci. Nat. Sér. 2, 17 : 290 (1842) ; Schulz in Pflanzenreich, Crucif.-Brassic. 2 : 12 (1923).

E. myagroides (L.) Hal. Consp. Fl. Graec. 1 : 123 (1900) ; Schulz in Pflanzenreich, Crucif.-Brassic. 2 : 9 (1923).

Type. Cult., Herb. Clifford (BM!).

KUWAIT. Fanaitis ; sea level ; growing near wells on site of old camping ground ; a tall mauve flowered plant with fine leaves and a sweet scent, there is also a white flowered variety ; eaten by camels, horses, etc. ; 20 Feb. 1935, *Dickson* 27 A [part]. Failaka Island ; 24 Mar. 1936, *Dickson* 139 A. Same locality ; among corn crops ; tall plant with pale mauve four petalled flowers and fine hair-like leaves ; 24 Mar. 1936, *Dickson* 296. Zor Hills ; *Cox* 69.

ARABIA. Bahrein Island ; near Ali ; flowers purple ; 9 Mar. 1936, *Fernandez* 3361.

Distribution. Algeria, Egypt, Balkans, Cyprus, Asia Minor, Syria, Palestine, Transjordan, Arabia, Iraq, Persia, Baluchistan.

There is a specimen labelled *Sinapis hispanica* in Linnaeus's own hand in the Linnean herbarium, but this is not the type of the species, for it is clear from the entry in Species Plantarum that Linnaeus adopted the species without change from his Hortus Cliffortianus (p. 338, 1737). The specimen in the Clifford herbarium (now at the British Museum) has been examined and its identity confirmed. The specimen in the Linnean herbarium, however, is not *Sinapis hispanica* but the allied plant we now know as *Reboudia pinnata* (Viv.) Schulz. This misidentification doubtless accounts for Linnaeus redescribing *Sinapis hispanica* as *Bunias myagroides* in 1767.

In the synonymy quoted the first 3 items are generally accepted synonyms, but *E. boveana* Coss. and *E. lineariloba* Boiss. were retained as distinct species by Schulz ; their validity is, however, open to grave

suspicion. Schulz, who uses the name *E. myagroides* (L.) Halacsy for *E. hispanica*, separates the three species on the form of fruit and cotyledons as follows :—

“ A. Siliquae articulus superior vix latior quam inferior.

a. Articulus superior apice fere semper truncatus. Cotyledones replicatae vel rarius superne recurvatae, radícula semper longiores.

1. *E. myagroides*.

b. Articulus superior apice interdum subconicus. Cotyledones rectae, radiculæ aequilongae.

2. *E. Boveana*.

B. Siliquae articulus superior manifeste latior quam inferior. Cotyledones rectae.

3. *E. lineariloba*.”

The cotyledonary characters used by Schulz have been examined for a total of 30 specimens in the Kew herbarium with the following results.

		Replicate	Recurved	Straight
Baluchistan	...	—	—	1
W. Persia	...	—	1	2
Iraq	...	—	—	4
Arabia	...	1	1	6
Palestine	...	1	1	1
Syria	...	—	—	1
Asia Minor	...	1	—	—
Cyprus	...	3	—	—
Balkans	...	4	—	—
Algeria	...	2	—	—

From these results it will be seen that the western specimens show only the replicate type of cotyledon, whereas further east the three types all occur. This is so in the small area from Kuwait to Bahrein and it seems unlikely that three distinct taxonomic units occur in such a small area. In fact the data should probably be interpreted as representing a geographical cline from east to west in respect of the length of the cotyledons, rather than 3 distinct taxonomic types. A gradual lengthening of the cotyledons would be naturally accommodated in the embryo first by the recurving of their tips and then by the complete folding of the cotyledon which gives the arrangement termed replicate. We have been unable to find any other distinctive characters to correlate with those of the cotyledons, and feel that the variation in the shape of the fruit, used as a specific character by Schulz, is probably due to the stages in development of the pod, as it varies greatly from one specimen to another and does not seem to link up with the cotyledonary characters.

The Cox specimen No. 69 from the Zor Hills, cited under *Leptaleum filifolium* DC. by Carter (Rec. Bot. Surv. Ind. 6 : 188, 1917), has been redetermined as *E. hispanica*.

In Mrs. Dickson's collections there has been some confusion between *Erucaria hispanica*, *Cakile arabica* and *Malcolmia grandiflora*, three mauve-flowered crucifers which must show considerable similarity to one another in the field. It is therefore uncertain to which the arabic name *seliyh* refers. It seems likely, however, that this word is in the nature of a generic term for this type of plant (compare the use of *hamdh* for various

desert *Chenopodiaceae*), as the following list of arabic names has been compiled from the literature. Their similarity suggests that they are all cognate words or variants (in transliteration or dialect) of the same word :—

sille (Muschler)—*Zilla spinosa*.

slth (Ascherson)—*Erucaria uncata*.

selikh (Schweinfurth)—*Reboudia microcarpa*.

zillae (Forsskal)—*Zilla spinosa*.

silleh
besilleh } (Ascherson & Schweinfurth)—*Zilla spinosa*.
zilleh }

seliyh (Dickson) { *Erucaria hispanica*
 Cakile arabica
 Malcolmia grandiflora

23. *Farsetia aegyptia* Turra, *Farsetia* Nov. Gen. 5, t. 1 (1765).

Type. Egypt ; *Turra* (not seen).

KUWEIT. Zor Hills ; 120 m. ; *albana* ; edges of sandy water courses growing amongst *arafaj* bushes, common ; a small bush the size of an *arafaj* bush, 14 inches, with a few smallish 4-petalled brown flowers and several oval flattish seed pods on each stem ; during summer a kind of milk comes out of the stalk when picked and a gum is found on the lower woody part of the bush and is eaten ; 25 Nov. 1934, *Dickson* 141. Zor Hills, 1935, *Dickson* 141 A.

ARABIA. Dhahran, on slope of Jebel ; sandy rocky ground ; grey leaved bush with flowers varying from greeny grey to yellow brown, seeds orange colour ; 29 March 1942, *Dickson* 465.

Distribution. Morocco, Egypt, Sinai, S. Palestine, Arabia.

Boissier (Fl. Or. 1 ; 159. 1867) describes a variety *gracilior* collected by Griffith in Afghanistan. This is a narrower-fruited plant and is conspecific with *F. edgeworthii* Hook. f. & Thoms. from the Punjab. Whether *F. edgeworthii* is specifically distinct from *F. aegyptia* is open to question, but at present the Kew herbarium contains no typical *F. aegyptia* from Persia or Baluchistan : there is a fragmentary specimen from Muscat, collected by Aucher, but apart from this the above records represent the eastern limit of the species.

The orthography of the name *F. aegyptia* is to be noted. The specific epithet has been almost universally quoted *aegyptiaca*, probably because Turra's publication is something of a rarity and has not been directly consulted by most authors. It is interesting, therefore, to note that there are 2 distinct " editions " of this work :—

- (1) Turra, Antonius. *Farsetia novum genus*. pp. 7 : tab. 1. Octavo. Venetiis 1765.
- (2) Turra, Antonius. *Farsetia novum genus : accedunt animadversiones quaedam botanicae*. pp. 14 : tab. 1. Quarto. Venetiis 1765.

The *animadversiones* contain notes on *Echinophora spinosa* L. and *E. tenuifolia* L. and *Decas Plantarum* of new species including *Bunias spinosa*

(see p. 299). The plate of *Farsetia aegyptia* has added to it, in the edition containing the *animadversiones*, a fruit of *Hedysarum cristatum* and the involucre and one scale of *Centaurea pinnatifida*. We have seen the octavo edition, which consists of *Farsetia* alone, at the British Museum (Natural History), and the quarto edition at the Linnean Society of London, where it is contained in Linnaeus's own library.

24. *Farsetia burtonae* Oliv. in Hook. Ic. Pl. tab. 1310 (1880).

Type. N. Midian ; *Burton* (K!).

KUWEIT. Kuwait ; sea level ; sandy soil ; a plant about 4 inches high with pointed leaves and pale, yellowy white flowers ; 20 May 1935, *Dickson* 220. Kuwait acrodrome ; sea-level ; small smooth-leaved branched plant with pale mauve flowers, somewhat resembling garden stock ; 15 March 1936, *Dickson* 283. Edge of Batin, western boundary of Kuwait ; 120 m. ; *al hadhara* ; puffy ground on the edge of Batin growing among *rindh* and *ajeram* (*hamdh*) ; small branched plant with grey-green leaves and pale mauve flowers which fade in sun almost to white, sometimes one darker and one paler flower at end of each branch ; 17 March 1946, *Dickson* 507.

ARABIA. About 60 miles north of Riyadh ; stony places ; 1 March 1865, *Pelly*.

Distribution. North-east Arabia.

Hitherto this species has only been known from *Burton's* plants collected in North Midian (which we take as the lectotype) and Central Midian. These have decidedly broader leaves than the Kuwait plants, but no other significant difference has been observed. The plants collected by Lt.-Col. *Pelly* are somewhat intermediate in this respect and strengthen the view that only one species is involved.

The name *F. burtonae* was first published (without description) in *Burton's Land of Midian (revisited)* (App. 4 : 1879) where the vernacular equivalent is given as *ghurayrd*.

25. *Horwoodia dicksoniae* Turrill in Journ. of Bot. 77 : 117 (1939).

KUWEIT. Subaihiya wells ; sea-level ; growing in close vicinity of the wells amongst many other flowers ; also seen at Araq wells ; *khasama* ; a bright purple flower, the heads only just appearing above the grass, &c., as its stems creep until about to flower ; eaten by camels, sheep, &c. ; 8 Feb. 1935, *Dickson* 162 (type).

ARABIA. Abraj al Khalija (c. 100 m. S. of Kuwait) ; 15 m. ; in sandy ground in *arafaj* [*Rhanterium epapposum* Oliv.] growing district ; a mauve flowered plant about 6 inches high ; only just in flower and would doubtless become much taller ; eaten by camels ; 10 Jan. 1935, *Dickson* 155. Abraj al Khalija ; 30 m. ; growing among *arafaj* in vicinity of C.A.S.O.C. Camp ; small plant with pale mauve flowers and very sweet smell ; 12 May 1943, *Dickson* 496. Dahana Red Sands ; 300 m. ; a single stemmed plant with a head of many mauve flowers with darker centres and lemon stamens, sweet smelling ; 11 Jan. 1938, *Dickson* 402 (grown from seed collected Oct. 1937).

Distribution. Endemic.

This interesting monotypic genus is most closely allied to *Sameraria* Desv. in the subtribe *Isatidinae*. For a full discussion of its morphology and affinities reference should be made to Turrill's paper quoted above.

26. *Lepidium aucheri* Boiss. in Ann. Sci. Nat. sér. 2, 17 : 195 (1842) ; Thellung, Die Gattung *Lepidium*, in Mitteil. Bot. Mus. Univers. Zurich, 28 : 119 (1906).

Type. Iraq, Bagdad ; *Aucher* 319 (G, K !—provisional lectotype).

KUWEIT. Quraniyeh, Failaka Island ; sea level ; on edge of fresh water pool containing ducks ; short bushy plant with many minute white flowers at the end of a spike ; 25 Mar. 1936, *Dickson* 302.

Distribution. Palestine, Iraq, Persia, Baluchistan, Afghanistan, N.W. India.

Boissier also quotes *Aucher* 4142 from the Persian Gulf ; this differs slightly in its shorter, denser fruiting racemes with the pods actually overlapping. There is, however, no reason to suppose it is not conspecific.

27. *Lepidium ruderale* L. Sp. Pl. 645 (1753) ; Thellung, Die Gattung *Lepidium* in Mitteil. Bot. Mus. Univers. Zurich, 28 : 135 (1906).

Type. Not precisely designated.

KUWEIT. Kuwait ; sea level ; old mounds and rubbish heaps ; plant about 5 ins. tall, branched at the top with small oval fruits and minute flowers of greenish white ; 12 Mar. 1936, *Dickson* 278.

Distribution. Widespread through the temperate regions of the northern hemisphere.

28. *Lepidium sativum* L. Sp. Pl. 644 (1753) ; Thellung, Die Gattung *Lepidium* in Mitteil. Bot. Mus. Univers. Zurich, 28 : 121 (1906).

Type. Not precisely designated.

KUWEIT. Kuwait ; sea level ; *rishad* ; on a rubbish heap, probably an escape from gardens ; branched plant 8 ins. high with minute white flowers and oval fruits ; grown in gardens and also found wild in the Suman according to Bedouin ; 12 Mar. 1936, *Dickson* 277. Failaka Island ; sea level ; *rishaad* ; in uncultivated garden, possibly an escape ; flowers white ; 23 Mar. 1938, *Dickson* 412.

Distribution. Widely distributed from Western Europe to N.W. India as a weed and subspontaneous in many parts of the world.

29. *Leptaleum filifolium* (Willd.) DC. Syst. Veg. 2 : 511 (1821).

Sisymbrium filifolium Willd. Sp. Pl. 3 : 495 (1801).

Type. Siberia, River Kumam (B—not seen).

KUWEIT. Arafjan ; rare ; Mar. 1933, *Dickson* 124. Same locality ; 1935, *Dickson* 124 A.

Distribution. Egypt, Iraq, Persia, Armenia, Caucasus, Afghanistan, Baluchistan, Transcaspia, Central Asia, N.W. India.

30. *Malcolmia africana* (L.) R. Br. in Ait. Hort. Kew. ed. 2, 4 : 121 (1812).

Hesperis africana L. Sp. Pl. 663 (1753).

Type. Not precisely designated.

KUWEIT. Mission compound, Kuwait ; 10 Mar. 1935, *Dickson* 171. Failaka Island ; fallow ground in vicinity of town ; plants 6 ins. high with small pale purple flowers and long seed pods ; 22 Mar. 1938, *Dickson* 410.

Distribution. Widespread from western Mediterranean countries to Central Asia and N. China.

31. *Malcolmia grandiflora* (Bunge) O. Kuntze var. *glabrescens* (Boiss.) Burtt et Lewis, comb. nov.

M. circinata Hook. f. et Thoms. in Journ. Proc. Linn. Soc. Bot. London, 5 : 155 (1861), *pro parte*.

M. bungei Boiss. var. *glabrescens* Boiss. Fl. Or. 1 : 226 (1867).

M. bungei Boiss. var. *assyriaca* Bornm. in Beih. Bot. Centralbl. 28 : 108 (1911).

Type. Baluchistan, Gurghina ; 1851, *Stocks* 975, *pro parte* (G, K !).

KUWEIT. Arafjan ; *sellyh* ; heliotrope scent, [flowers purple] also observed with white flowers ; March 1933, *Dickson* 27. Same locality, March 1933, *Dickson* 45 ; 1935, *Dickson* 45 A ; 1936, *Dickson* 45 B. Arafjan Wells, 35 miles S. of Kuwait ; sea level ; growing profusely in vicinity of wells ; sweet-scented branched plant, mauve flowers, smooth leaves and stems ; eaten by camels, horses, &c. ; 15 March 1945, *Dickson* 519. Zor Hills ; *Cox* 59.

Distribution (of var.). Baluchistan, Afghanistan, Iraq and Arabia. The species extends to Turkestan.

There has been a strange reluctance to take up in *Malcolmia* the epithet *grandiflora* from *Dontostemon grandiflorum* Bunge (in Arb. Naturf. Ver. Riga, 1 : 147. 1847), but as this synonym was quoted under *Malcolmia circinata* Hook. f. & Thoms. and under *M. bungei* Boiss. these two names are both illegitimate in modern nomenclature. The combination *M. grandiflora* was made by O. Kuntze in 1887 (in Acta Hort. Petrop. 10 : 167), but has been till now omitted from Index Kewensis ; it is correctly adopted by Vassilchenko (in Komarov, Fl. U.R.S.S. 8 : 275. 1939).

The precise identity of *M. bungei* var. *glabrescens* Boiss. needs a word of explanation. Boissier's description is simply "Caulis glaber, folia tantum margine scabra", his synonym *M. circinata* Hook. f. & Thoms., his specimens "in Affghaniâ (Griff. ex Hook.), Belutschîâ prope Ghurghina (Stocks !)". Boissier's characters are more restricted than the specific description given by Hooker & Thomson which included a consideration of *Dontostemon grandiflorum* Bunge, the specimen of which at Kew is inscribed *M. circinata* in Hooker's hand. It is clear that the type of *M. bungei* var. *glabrescens* is the Stocks specimen examined by Boissier himself. There are three sheets of Stocks material at Kew and they show some variation in indumentum, one plant having a decidedly hairy stem and the leaves hairy on both surfaces. The specimen which we have

regarded as a duplicate of Boissier's type is therefore one of Stocks' plants which agrees with the characters of glabrous stem and marginally scabrid leaves.

With the precise identity of var. *glabrescens* Boiss. thus defined we are unable to separate from it Bornmüller's var. *assyriaca* from the Jebel Hamrin of Iraq.

The Arabian specimens differ rather markedly from Bunge's type of *M. grandiflora* in their thicker more glabrous leaves and more or less glabrous stems; the hairy plant of Stocks' collection mentioned above and other specimens from Afghanistan form, however, geographical and morphological links and we therefore follow current practice in retaining the Arabian & Iraq material in varietal rank.

In Kuwait, as elsewhere in the species-area, there is considerable variation in the size of the flowers. The petals vary from 10–12 mm. \times 2 mm. in the smaller forms, up to 16 mm. \times 3 mm. in *Dickson* 27, where they are somewhat longer in proportion to the size of the calyx than the 3 : 1 ratio of the smaller flowered type. The fruits of the Arabian material are glabrous with the exception of No. 27 in which they have scattered minute bifurcate or sometimes simple hairs; these hairy fruits do not approach the Transcaspian var. *lasiocarpa* Regel which Vassilchenko (l.c.) now separates specifically as *M. turkestanica* (Regel) Litw.

The specimen of *M. grandiflora* collected by Cox (No. 59) was identified as *Chorispora syriaca* Boiss. by Carter (Rec. Bot. Surv. Ind. 6 : 188. 1917) and forms the sole record of that species in Blatter's *Flora Arabica* (p. 34), from which the name must now be expunged.

32. *Maresia pygmaea* (DC.) Schulz in Pflanzenreich. Crucif.-Sisymb. 210 (1924).

Hesperis pygmaea DC. Syst. Veg. 2 : 445 (1821).

Malcolmia pygmaea (DC.) Boiss. Fl. Or. 1 : 222 (1867).

Type. "Syria"; Savigny (G—not seen).

KUWAIT. Arafjan; Mar. 1933, *Dickson* 14 & 103. Arafjan; 12 m.; *ragaija*?; common in sandy ground, growing amongst other plants such as *hanouwa* & *ribla*; a small plant only about $2\frac{1}{2}$ –3 ins. high with leaves growing out in a circle at the base, and the thin flower stalk has one or two pale mauve 4-petalled flowers, the undersides being darker mauve; the seed pods are about 1 inch long and thin; 5 Jan. 1935, *Dickson* 149. Shaibah; sea level; 30 miles south of Kuwait; in vicinity of shore on very sandy ground; a small bushy variety of *Malcolmia* with many leaves growing upright and small pale purple flowers, darker purple underneath; 1 Feb. 1938, *Dickson* 404.

Distribution. Egypt, Syria, Palestine, Transjordan, Arabia, S. Persia.

The Kuwait material links up collections of this species from localities in the Persian Gulf (Bushire & Karrak) with those of western Arabia and the S.E. Mediterranean region.

Hesperis pygmaea is usually attributed to Delile; for instance Schulz (l.c.) cites "H. pygmaea Del. Fl. aegypt. Illustr. (1813) 19, n. 596 Suppl. fig. 15, n.v.". In *Flora aegyptiaca Illustratio* this name is a *nomen nudum*, while the illustration was never published till reproduced by C. & W.

Barbey (Herb. Levant, t. 8. 1882). The first description was published by De Candolle, based on a specimen collected by Savigny and sent to him by Delile.

33. *Matthiola arabica* Boiss. in Ann. Sci. Nat. Sér. 2, 17 : 49 (1842).

Type. Sinai ; 26 May 1835, *Schimper* 314 (G, K !).

ARABIA. On road to Hofuf, S.W. of Abqek oil field ; sandy ground in a small area where rain had fallen and sheep were grazing ; plant 7 ins. high with pale mauve flowers and long seed pods ; 23 Mar. 1947, *Dickson* 529. Found sprinkled all over plain from Kuwait to Regab ; 1865, *Pelly*.

Distribution. Sinai, Transjordan, Arabia.

This name has unfortunately been repeated by Velenovsky for a different plant—*M. arabica* Velen. in Sitz. Kön. Böhm. Gesellsch. Wiss. Prag, 11 : 12 (1911).

34. *Matthiola oxyceras* DC. Syst. Veg. 2 : 173 (1821) ; Delessert, Ic. Sel. Pl. 5, t. 11 (1823).

Type. Syria, near Damascus ; *Labillardière* (not seen : Delessert's illustration is based on this material and has been taken as typical in studying the species).

KUWEIT. Arafjan ; *shigara* ; Mar. 1933, *Dickson* 5, 137, 138. Arafjan ; 1935, *Dickson* 137 A. Zor Hills ; *Cox* 2.

Distribution. Cyprus, Asia Minor, Sinai, Transjordan, Palestine, Syria, Arabia, Iraq, Persia.

Even in the narrow sense this species is highly variable and its delimitation from *M. bicornis* S. & S., DC. and *M. livida* DC. is difficult. We feel that *M. bicornis* should be restricted to the robust species with large broad-petalled flowers, and the fruit-horns upcurved from a broad flat base ; this is found in the Balkan Peninsula & Asia Minor. *M. livida** is an Egyptian species which extends to Sinai and North Africa : it has smaller flowers with narrow petals, and the fruits are short horned and flexuous or even coiled.

As to the name *M. longipetala* (Vent.) DC. (*Cheiranthus longipetalus* Vent. Jard. Cels. 93, 1800-2), which certainly antedates *M. oxyceras*, and has been adopted by Holmboe (Stud. Veg. Cypr. 86, 1914) and Zohary (in Pal. Journ. Bot. J. ser. 2 : 156. 1941), we prefer not to take this up at present owing to the fact that both Ventenat's illustration and description indicate flowers with pedicels 8 mm. long. All our material of *M. oxyceras* has subsessile flowers, one sheet only (*Trott* 1153, from Ahwaz : Persia) having pedicels of the lowest flower as much as 3 mm. long.

Within *M. oxyceras* as accepted here there is a wide range of variation in petal shape, fruit size, fruit horns and indumentum. At present we are unable to establish any satisfactory correlation between these characters (few collectings include both flowers and ripe fruits and the final condition of the fruit horns is often very difficult to infer from juvenile

* *Matthiola livida* DC. Syst. Veg. 2 : 174 (1821).

Cheiranthus lividus Del. Fl. Aeg. Illustr. 67 (1812) *nomen nudum*.

specimens) ; nor have we sufficient material to allow us to appreciate the variation that may occur in a single population.

The Kuwait specimens show flowers with long undulate petals 20–25 mm. \times 1.3 mm. and incurved fruit-horns 3–4 mm. long, and seem to approach the var. *forcipifera* Boiss., while other material from Syria, Palestine and especially Iraq has fruits with prominent stigmas and long often deflexed horns up to 15 mm. (Kirkuk : *Guest* 1358), and has less undulate, shorter and broader petals 15–20 mm. \times 3–3.5 mm.

The fruits of specimens from all the above areas are long and slender ; 60–70 mm. \times 1 mm. from Kuwait and up to 80 mm. \times 1.5 mm. from Iraq. The Cyprus material however has much stiffer and stouter fruits 50–60 mm. \times 1.5–2 mm. and the horns are also thicker and only 5–10 mm. long in the ripe fruit. Petals are of the blunter and less undulate type, 20–22 mm. \times 3–5 mm.

35. *Moricandia sinaica* (Boiss.) Boiss. Fl. Or. 1 : 386 (1867) ; Schulz in Pflanzenreich, Crucif.—Brassic. 2 : 68 (1923).

Brassica sinaica Boiss. Ann. Sci. Nat. Sér. 2, 17 : 85 (1842).

Type. Sinai ; *Aucher-Eloy* 167 (G, K !).

ARABIA. Durahiyeh ; 660 m. ; *ethn al hamar* ; among ruins of old city ; about 2 ft. high with large smooth fleshy leaves, small purple flowers and long thin seed pods which open on both sides at the base and contain minute red seeds ; 24 Oct. 1937, *Dickson* 385.

Distribution. Sinai, "Arabia Petraea", Persia, Baluchistan, N.W. India.

36. *Notoceras bicornne* (Ait.) Amo, Fl. Fanerog. Penins. Iber. 6 : 536 (1873).

Erysimum bicornne Ait. Hort. Kew. 2 : 394 (1789).

Type. Canary Islands ; *Masson* ; cult. at Kew (BM !).

KUWEIT. Batin-Mahazul, 100 miles west of Kuwait ; 120 m. ; puffy ground on edge of Batin ; small branched inconspicuous plant with minute white flowers ; 17 Mar. 1946, *Dickson* 512. Zor Hills, *Cox* 78.

Distribution. Canary Islands, S.E. Spain, Morocco, Algeria, Tunisia, Egypt, Sinai, Palestine, Arabia, Afghanistan, Baluchistan, Punjab.

Blatter, Maire and others quote this species as *N. bicornne* (Ait.) Caruel (Prod. Fl. Tosc. 536. 1860). We have been unable to trace any mention of the plant in this reference, but have noted that the page number 536 is the same as that on which the combination was made by Amo y Mora in his Flora Fanerogamica de la Peninsula Iberica : a suspicious coincidence !

37. *Physorhynchus chamaerapistrum* (Boiss.) Boiss. Fl. Or. 1 : 403 (1867) ; Schulz in Pflanzenreich, Crucif.—Brassic. 2 : 35 (1923).

Zilla chamaerapistrum Boiss. in Ann. Sci. Nat. Sér. 2, 17 : 381 (1842).

Type. Persia australis ; *Aucher-Eloy* 4169 A (G, K !).

KUWEIT. Kuwait, Agency Compound ; sea level ; growing near tennis court screens, seed possibly planted by a bird ; a bush about 3 ft. high and spreading, leaves large thick and smooth, flowers bright purple ; strange plant in Kuwait ; 3 Mar. 1937, *Dickson* 322.

Distribution. South Persia.

The inference from Mrs. Dickson's notes is that this species is not really native in Kuwait ; it is a very conspicuous plant and could scarcely have been overlooked if it occurs at all commonly.

38. *Savignya parviflora* (Del.) Webb apud Parlatore in Giorn. Bot. It. 2 : 215 (1847) ; Schulz in Pflanzenreich, Crucif. Brassic. 2 : 57 (1923).

Lunaria parviflora Del. Fl. Egypte, 104, tab. 35, f. 3 (1812).

Savignya aegyptiaca DC. Syst. Veg. 2, 283 (1821).

Type. Egypt, Saggarah, pyramides ; Delile (P, K !).

KUWEIT. Arafjan ; *gelaigelan* ; rare ; Mar. 1933, *Dickson* 6 ; 1935, *Dickson* 6 A ; 1936, *Dickson* 6 B. South from Kuwait through Luquait ; found sparingly during the march of the 18th, 19th and 20th Feb. 1865, *Pelly*. Zor Hills ; *gulgulan* or *gulaigalan* ; Cox 13.

Distribution. Egypt, Sinai, "Arabia Petraea", Arabia, Iraq.

39. *Schimpera arabica* Hochst. et Steud. in Schimp. Pl. Arab. Exsicc. No. 244 (1835) cum diagn.

S. persica Boiss. Diagn. ser. 1, 6 : 18 (1845).

Type. Arabia Petraea, in the plain of Marcha ; 18 Mar. 1835, *Schimper* 244 (? , K !).

KUWEIT. Arafjan ; *sufra* ; flowers yellow ; Mar. 1933, *Dickson* 29, 100 ; 1935, *Dickson* 100 A. Kuwait ; *sufar* ? ; sea level ; very common yellow flower growing everywhere ; a bright yellow flower growing about 9 or 10 ins. high and very similar to a larger plant called *sufar* by the Arabs ; eaten by camels, goats, sheep, etc. ; 8 Feb. 1935, *Dickson* 163.

Distribution. Egypt, Sinai, "Arabia Petraea", N. Arabia, S.W. Persia, Iraq, Central Syria.

Boissier (l.c.) recognises another species, *S. persica*, from the Persian Gulf, which he distinguishes from *S. arabica* as having larger flowers and more deeply divided leaves. He also states that the lower fruits have the rostrum erect, and the upper oblique, while in *S. arabica* there is an oblique rostrum throughout. Though plants with these differing characters certainly occur, the material in the Kew herbarium is at the moment insufficient to confirm the existence of a second species, and they are therefore treated as one.

The Kuwait specimens, except for *Dickson* 100 A (part), show only immature fruits. In the material of *Dickson* 163 the leaves are more deeply divided than in the rest of the specimens of this collection, rather suggesting Boissier's *S. persica*. It seems unlikely however that there are two species of *Schimpera* in this small area.

The distribution is very limited and extends directly from Egypt to the Persian Gulf, with a branch off to Iraq and Central Syria.

40. *Sinapis arvensis* L. Sp. Pl. 668 (1753) ; Schulz in Pflanzenreich, Crucif.-Brassic. 1 : 121 (1919).

Type. Not precisely designated.

KUWEIT. Failaka Island ; cornfield ; tall yellow flowers and thin seed pods ; 25 Mar. 1936, *Dickson* 291.

Distribution. Widespread from western Mediterranean countries to Baluchistan. Also in North and South America.

Owing to the very young condition of the fruits it is impossible to determine this specimen with real confidence.

41. *Sisymbrium irio* L. Sp. Pl. 659 (1753) ; Schulz in Pflanzenreich, Crucif.-Sisymb. 89 (1924).

Type. Not precisely designated.

KUWAIT. Kuwait ; sea level ; on mounds inside walls and also on rubbish heaps ; plant about 14 ins. tall with small 4 petalled yellow flowers and long thin seed pods ; 12 Mar. 1936, *Dickson* 279.

Distribution. Widespread from western Mediterranean countries to N.W. India.

42. *Sisymbrium septulatum* DC. Syst. Veg. 2 : 471 (1821) ; Schulz in Pflanzenreich, Crucif.-Sisymb. 120 (1924).

Type. Aleppo ; *Russel* (BM!).

KUWAIT. Kuwait ; sea level ; rubbish heap inside town walls ; a much branched plant with toothed leaves and yellow flowers, with the calyx opened out like four leaves, thin seed pods and smooth green leaves and stem ; 12 Mar. 1936, *Dickson* 282.

Distribution. Asia Minor, Palestine, Syria, Arabia, Iraq, Persia, Afghanistan, Baluchistan.

43. *Torularia torulosa* (Desf.) Schulz in Pflanzenreich, Crucif.-Sisymb. 214 (1924).

Sisymbrium torulosum Desf. Fl. Atlant. 2 : 84, t. 159 (1798).

Malcolmia torulosa (Desf.) Boiss. Fl. Or. 1 : 225 (1867).

Type. Tunis : Sbiban ; *Desfontaines* (F—not seen).

KUWAIT. Arafjan ; *al hassar* ; 1935, *Dickson* 55 A (part).

Distribution. Algeria, Libya, Egypt, Cyprus, Asia Minor, Caucasus, Palestine, Syria, Iraq, Persia, Turkestan, Afghanistan, Baluchistan, N.W. India.

var. ***scorpiuroides*** (Boiss.) Schulz in Pflanzenreich, Crucif.-Sisymb. 217 (1924).

Sisymbrium scorpiuroides Boiss. in Ann. Sci. Nat. Sér. 2, 17 : 74 (1842).

Type. Originally quoted by Boissier as Persia : Ispahan ; *Aucher-Eloy* 4166, but this specimen at Kew has hairy pods : the specimen cited in Flora Orientalis is no. 4155 (not seen).

KUWAIT. Arafjan ; *al hassar* ; Mar. 1933 *Dickson* 55 ; 1935, *Dickson* 55 A (part). Kuwait, Ras al Ardh ; sea level ; sandy ground ; a bushy annual herb with almost smooth leaves and hairy stems, flowers small and white and seed pods mostly curled around in a ring with a few straight ones about $\frac{1}{2}$ in. long ; 2 Mar. 1936, *Dickson* 272. Failaka Island ; sea level ; cornfields and fallow ground ; white flowers, long seed pods, plants 4-6 ins. high ; 22 Mar. 1938, *Dickson* 415. Zor Hills, *Cox* 60.

Distribution. As for typical *T. torulosa*, except for Algeria, Libya and Cyprus.

The Kuwait material shows the gradation of coiling of the pod noted by Schulz in this species. Thus specimens of *Dickson* 55 and 415 show pods not coiled, *Dickson* 55 A (part) most pods straight, but with a few coiled on the same plant, and *Dickson* 272 most of the pods well coiled. *Dickson* 55 A includes material with hairy and glabrous pods on the same sheet, but on separate specimens.

44. *Zilla spinosa* (Turra) Prantl in Engler & Prantl, Pflanzenfam. 3, abt. 2 : 175 (1891) ; Schulz in Pflanzenreich, Crucif.-Brassic. 2 : 30 (1923).

Bunias spinosa Turra, Farset. nov. gen. animadv. 11 (1765) ; Linn. Mant. prima, 96 (1767).

Type. Cult. from Egypt ; *Turra* (not seen).

ARABIA. About 60 miles N. of Riyadh ; a bush 3 ft. high and about 6 ft. in circumference, not abundant ; 1 & 2 Mar. 1865, *Pelly*.

Distribution. Libya, Central Sahara, Egypt, Sudan, Sinai, Palestine, Transjordan, Arabia.

Bunias spinosa is usually attributed to Linnaeus, probably because he quoted Turra's diagnostic phrase but not his actual binomial. For a note on Turra's publication see under *Farsetia aegyptia* (p. 290).

CAPPARIDACEAE

45. *Capparis cartilaginea* Decne. in Ann. Sci. Nat. Sér. 2, 3 : 273 (1835).

Type. Sinai ; Jun. 1832, *Bové* 148 (P, K !).

ARABIA. Riyadh ; 660 m. ; *mallas* ; stony sides of cliff edge of Wadi Hanifa ; a bush about 2 ft. high and 1½ ft. across, very thorny and with heart shaped leaves ; 25 Oct. 1937, *Dickson* 390 [leaves only].

Distribution. Egypt, Sudan, Somaliland, Abyssinia, Arabia, Iraq, Sind.

Dcaisne quotes the type number of *C. cartilaginea* as *Bové* 143. In the Kew Herbarium there is a *Bové* specimen with the same locality as that given by Dcaisne, but with the number 148. It seems that this is the correct number as, in the same paper, Dcaisne quotes *Bové* 143 under *Moricandia arvensis* (L.) DC.

46. *Capparis spinosa* L. Sp. Pl. 1 : 503 (1753).

Type. The specimen of *Capparis aculeata* in the Hortus Cliffortianus herbarium (BM !).

ARABIA. Durahiyeh, 12 miles N.W. of Riyadh ; 960 m. ; *shafellah* ; among rocks around the ruins of the old city above Wadi Hanifa ; low thorny bush, no flowers available at this time of year ; 24 Oct. 1937, *Dickson* 386 [leaves only].

Distribution. Widespread from western Mediterranean countries to Afghanistan.

Boissier (Fl. Or. 1 : 420. 1867) has included a number of varieties under *C. spinosa* and this Arabian specimen may possibly be var. *leucophylla* Boiss., but as the material is sterile an accurate identification cannot be made. It certainly has shorter petioles and rounder leaves than the

type, which also lacks the rather dense indumentum of the lower leaf surface.

47. *Cleome oxypetala* Boiss. var. ? *micrantha* Boiss. Fl. Or. 1 : 415 (1867).

Type. Arabia, Muscat ; *Aucher-Eloy* 4181 (G, K !).

ARABIA. From hollows between the mounds in the neighbourhood of Regab ; 1865, *Pelly*.

Distribution (of var.). Arabia.

The status of this plant is quite uncertain. Boissier placed it as a variety of *C. oxypetala*, but three other species are also very closely related. The material of these in the Kew herbarium is fragmentary and it is not yet possible to say which may represent good species, but the following notes summarize the available data and their very bareness will indicate the information that is needed before these problems can be elucidated. These species are :—

1. *C. glauca* DC. Prod. 1 : 239 (1824) ; Deless. Ic. Sel. 3 : 2, t. 4 (1837).

Type. “Mesopotamia” ; *Olivier* & *Brugière* (P—not seen).

The type specimen consisted of vegetative and fruiting parts only. It appears that the plant is glaucous with ovate-acute leaves, and there are bracts to at least the lower fruits, which are smooth, about 6 mm. wide and have a short style.

2. *C. oxypetala* Boiss. Diagn. Sér. 1, 6 : 20 (1845).

Type. Persia, Dalechi ; *Kotschy* 142 (G, K !).

The type specimen is in this case only in flower, but Boissier later (Fl. Or. 1 : 415. 1867) identified with it another Persian specimen collected by *Bunge* which has almost ripe fruits. Accepting these two specimens we may say that *C. oxypetala* has leaves and fruits glabrous, but the inflorescence glandular ; leaves ovate-acute and small bracts to the few lowest flowers only, which are yellow and 8–10 mm. long. The fruits are up to 4 mm. broad and the style is long and curved as compared with var. *micrantha*.

3. *C. stocksiana* Boiss. Diagn. Sér. 2, 1 : 47 (1853).

Type. Baluchistan, Zahree ; 1851, *Stocks* 1110 (G, K !).

The type material has both flowers and fruits. The elliptic leaves and the young fruits are glandular ; the lower bracts are leafy, becoming smaller and finally absent towards the top of the inflorescence. The flowers are purple and 5–7 mm. long, while the fruits are up to 8 mm. broad, with a long and curved style.

4. *C. kotschyana* Boiss. Fl. Or. 1 : 413 (1867).

Type. “Assyria”, between Besch Abur and Bauerd ; 1841, *Kotschy* 402 (G, K !—provisional lectotype).

Kotschy 402 in the Kew herbarium is a fruiting specimen which has large ovate-obtuse leaves up to 37 mm. across at the base, grading to much smaller ovate-acute leaves and finally to the sessile leafy bracts subtending the lower flowers. The leaves and fruits are glaucous the

fruits being very broad, up to 12 mm. and having a long style. Boissier also cites two other specimens under *C. kotschyana*, one of these was collected by *Blanche* in the Syrian desert (this we have not seen), the other is *Chesney* 149 from near the Euphrates. This last is a flowering specimen and may have provided the description of the flowers given by Boissier, but the leaves differ from *C. kotschyana* by being small, almost ovate-sub-orbicular and glabrous, but not glaucous. Other specimens in the herbarium which have been included under this species have glaucous striate fruits similar to the type, but they are very much narrower, only up to 7 mm. wide, and it is suggested that *Kotschy* 402 may in fact be a "freak" specimen with exceptionally large pods. If that is so it may eventually be necessary to merge all this material with the little known *C. glauca* DC.

C. oxypetala Boiss. var. *micrantha* Boiss. (l.c.) has both the ovate-sub-orbicular leaves and the young fruits glandular, and there are small bracts almost to the tip of the inflorescence. The flowers are small, 5–7 mm. long, and (in Pelly's plant at least) purple or purple veined, while the fruit is up to 5 mm. wide. The style is short, thick and straight, and the stigma is quite distinct, being almost twice as broad as the style. There is at Kew material of a *Cleome* collected in Oman by *J. Fernandez* (719, 721, 775, 1561) which seems referable to typical *C. oxypetala* Boiss. and thus, as it extends the range of that species to N.E. Arabia, enhances the possibility that Aucher's specimen is merely a variety of it. *Fernandez* 1561 is a young sterile plant and has large leaves similar to those of *C. kotschyana*: it may well be that more complete collections will show that all these species are really one.

Another species which is closely allied is *C. glaucescens* DC. (Prod. 1: 239. 1824), but it is easily distinguished in the fruiting condition as it has glabrous seeds, and not hairy ones, as have all the other species named above.

Blatter cites Pelly's specimen from Regab under *C. trinervia* Fres. and it was so determined by Gilg and Benedict. *Aucher-Eloy* 4181 is cited both under *C. oxypetala* and *C. trinervia*! *C. trinervia* is a distinct species characterised by the dense glandular indumentum of leaves and shoots.

RESEDACEAE

48. *Ochradenus baccatus* Del. Fl. Egypte 92, t. 31 (1812).

Type. Egypt, Medynet-abou, Qournah et Denderah, sur les limites du désert; Dec., *Delile* (P—not seen).

KUWEIT. Zor Hills; 120 m.; *gurthi* or *garthi*; sandy torrent beds, rare in Kuwait; flowers yellow, no petals visible, only stamens; a large bush growing about 4 ft. high; eaten by camels; 25 Nov. 1934, *Dickson* 140.

ARABIA. District of Ormah; halting ground and neighbourhood of Regab; scarce; 1 Mar. 1865, *Pelly*.

Distribution. Egypt, Sudan, Abyssinia, Somaliland, Sinai, Arabia, Transjordan, Palestine, Syria, Persia, Afghanistan, Baluchistan, Sind.

49. *Oligomeris linifolia* (Vahl) Macbride in Contr. Gray Herb. n.s. 53: 13 (1918); Bolle in Engler & Prantl, Pflanzenfam. ed. 2, 17 B 685 (1936).

Reseda linifolia Vahl in Hornemann, Hort. Hafn. 2 : 501 (1814).

"*Oligomeris subulata* (Del.) Webb" sec. Durand & Schinz, Consp. Fl. Afr. 1 (2) : 187 (1898) et auct. plur.

Type. Cultivated at Copenhagen Botanic Garden (C—not seen).

KUWEIT. Kuweit ; stony ground in vicinity of town ; a tall plant somewhat resembling mignonette with fine leaves, and flower heads of hard small greenish white flowers ; eaten by goats ; 25 Apr. 1935, *Dickson* 217.

ARABIA. Trucial Coast, Dubai ; desert ; green flowers dying off to yellow ; bushy plants growing in patches ; fodder for sheep and goats ; 21 Feb. 1937, *Holmes* (*Dickson* 349 H).

Distribution. Canaries, North Africa, Central Sahara, Egypt, Sudan, Arabia, Transjordan, Palestine, Syria, Iraq, Afghanistan, Baluchistan, Punjab ; California and Mexico.

Fuller synonymy of this much described species may be obtained from the references given above. Macbride was the first to call attention to the fact that *Reseda subulata* Delile (Fl. Aeg. Ill. 13. 1812) was a *nomen nudum*. It may be as well to clarify this reference, "Fl. Aeg. Ill.". Delile contributed 2 items to the report of the Commission d'Egypte (Description de l'Egypte, un recueil des observations et des recherches qui ont été faites en Egypte pendant l'expédition de l'armée Française, ; both appeared in the second volume of this work and were entitled :—

(i) Florae aegyptiacae illustratio.

(ii) Flore d'Egypte. Explication des planches.

The latter consisted of the descriptions to accompany the 62 large folio plates prepared by Redouté. This is the major work and is usually cited simply Delile, Fl. Egypte. The former consists of a mere list of over 1000 plants collected in Egypt, with their localities and often with arabic names and a few notes. Some of the new names published therein are validated by a few descriptive words, but by far the greater part are *nomina nuda*. This has been insufficiently realised and in the course of the present study a number of these will have to be rejected, or taken up from a later source : such are *Cheiranthus lividus* (see p. 295), *Hesperis pygmaea* (see p. 294), and there are others to appear later.

Reference to P. Barker Webb's writings on this genus has brought to light two points of interest. The first concerns the typification of the synonyms in which the epithet *subulata* is used. The first *description* was as *Resedella subulata* Webb (Phyt. Can. sect. 1 : 108, tab. 11), but, although *Reseda subulata* Del. was quoted as a synonym, it is clear that the description and illustration were based on Webb's own Canary Island collectings, which must therefore typify the name. Subsequently Webb accepted the name *Oligomeris* and re-christened his Canary Island plant *O. resedella* Webb. At the same time he described a distinct species *O. subulata* Webb ; under this *Reseda subulata* Del. appears once more as a synonym, but the type of *Oligomeris subulata* Webb is clearly among the Egyptian and Nubian specimens which he quotes from the Florence herbarium. Delile's specimen therefore never became the type of a valid name and the citation *O. subulata* (Del.) is quite erroneous.

The second point of interest is bibliographical and concerns the dates of publication of the *Phytographia Canariensis*. These have been given in detail by W. T. Stearn (see Journ. Soc. Bibl. Nat. Hist. 1 (2) : 49. 1937), who accepts the dates on a manuscript list found in Webb's copy of the work at Florence. These dates, Stearn remarks, "since they do not conflict with evidence from other sources, may be regarded as authentic." The genus *Resedella* was published on :—

Sect. 1, page 108 (livraison 17) : dated 18 May 1837.

tab. 11 (livraison 4) : dated 12 March 1836.

In a later paper (Fragm. Fl. Aeth. Aeg. 26. 1854) Webb wrote "*Oligomeris glabrescentis* sphalm. *glaucescentis* Camb. icon sine descriptione lucem perpauces viderat dies, cum icone et descriptione instructa apparuit *Resedella* nostra, et sub idem tempus (eodem certe anno) in America *Ellimiam* Nutt. publici juris fecerunt cll. Torrey et Gray."

Now the publication of *Ellimia* Nutt. ex Torr. & Gray (Fl. N. Amer. 1 : 125) is clearly dated, on the work itself, as having taken place in July 1838. The genus *Oligomeris* Cambess. (in Jacquemont, Voy. l'Inde, Botanique, 23, tab. 25) is also given as having been published in 1838 by Pfeiffer* (Nomencl. Bot. 2 (1) : 489. 1874), and this date was accepted in the list of *nomina conservanda* which appears as an appendix to the International Rules of Botanical Nomenclature. A note on the last page of the work itself runs "Partis botanicae typographia incoepa anno 1834, absoluta fuit septembre 1844."

To summarise these points, the illustration of *Resedella* Webb was apparently published in 1836†, the text in 1837. *Ellimia* Nutt. ex Torr. & Gray appeared in July 1838. *Oligomeris* Cambess. was apparently published in 1838 also, but, as printing began in 1834, Webb may have seen a plate (he mentions a plate without description) at an earlier date. Only thus can his statement that *Oligomeris* appeared a few days before his *Resedella* be explained, and that leaves two other points as mysteries. First, why did he say that *Ellimia* was published in the same year, for that could only be 1838? Secondly, why did he say that the plate of *Oligomeris* appeared a few days before his *Resedella* was published with plate and description? For, according to the dates of the Florence MS accepted by Stearn and quoted above, the publications of plate and text of *Resedella* were separated by 14 months! Perhaps, after all, the most likely explanation is that Webb, when he wrote his second paper was completely mistaken in the dates he assigned to *Resedella*.

It is fortunate indeed that the nomenclature of this genus is safeguarded by the fact that *Oligomeris* already appears on the roll of *nomina conservanda*.

50. *Reseda arabica* Boiss. Diagn. Ser. 1, 1 : 6 (1842).

Type. Egypt, Cairo; *Schimper* 506, leg. A. Wiest 1835 (G, K!—provisional lectotype).

KUWEIT. Arafjan; *ithiniban*; Mar. 1933, *Dickson* 94; 1935, *Dickson* 94 A. South from Kuwait to the border : during the march of the 18th, 19th

*Pfeiffer gives the dates of *Christolea* Cambess. (l.c. p. 17) and *Douebia* Cambess. (l.c. p. 18) as 1837.

†Certainly before April 1837 as it is listed by name by Oken in his review in *Isis*, 1837 (4) : 246 (April 1837). We are indebted to Mr. W. T. Stearn for this reference.

and 20th of Feb. and neighbourhood of Kuwait ; 1865, *Pelly*. Zor Hills, Cox 5.

Distribution. Algeria, Tunisia, Tripolitania, Egypt, Sinai, Transjordan, Arabia, Southern desert of Iraq.

R. tetragyna Forsk. (Fl. Aeg. Arab. 92. 1775) is a name which is often quoted as a synonym of *R. arabica*. It is very inadequately defined and as there seems to be no specimen extant (Christensen in Dansk. Bot. Arkiv, 4, Nr. 3 : 19. 1922) it is best disregarded.

Schimper 506, of which there is a duplicate in the Kew herbarium is chosen as the provisional lectotype. Boissier also quoted a specimen collected in Sinai by *Aucher*.

Cox's specimen has previously been identified (Rec. Bot. Surv. India, 6 : 188. 1917) as *R. aucheri* Boiss., a much larger plant which reaches a height of 2 ft. or more. *R. arabica* seldom exceeds 1 ft.

51. *Reseda decursiva* Forsk. Fl. Aeg. Arab. p. LXVI (1775).

R. propinqua R. Br. in Denham & Clapp. Trav. & Discov. in N. & Centr. Africa, App. 227 (1826).

Type. Alexandria ; *Forsk.* (C—not seen).

KUWAIT. South from Kuwait to the border : during the march of the 18th, 19th and 20th Feb. and in the neighbourhood of Kuwait : 1865, *Pelly*. Arafjan ; Mar. 1933, *Dickson* 40 ; 1935, *Dickson* 40 A.

Distribution. Morocco, Algeria, Tunisia, Egypt, Transjordan, Palestine, Syria, Arabia, Persia, Iraq.

The Kuwait specimen agrees with the type of *R. propinqua* R. Br., which we have examined at the British Museum (Nat. Hist.).

52. *Reseda muricata* Presl, Bot. Bemerk. 8 (1844).

Type. Sinai ; 10 May 1835, *Schimper* (? , K !).

KUWAIT. Failaka Island ; uncultivated rather salty ground ; tall branched herb with hard woody base ; 25 Mar. 1936, *Dickson* 301. Kuwait ; growing among pits of gypsum ; in thick bushy clumps, with heads of flowers resembling mignonette, height 12 ins. ; 11 Nov. 1935, *Dickson* 268.

ARABIA. Dhahran ; 60 m. ; *ithiniban* ; sandy slope below rocks of Jebel and among rocks on top ; a bushy plant 18 ins. high, heads of pale pinky green flowers ; 31 Mar. 1942, *Dickson* 470.

Distribution. Sinai, Palestine, Arabia.

CISTACEAE

53. *Helianthemum kahiricum* Del. Fl. Egypte 93, t. 31 (1812) ; Grosser in Pflanzenreich, Cistac. 95 (1903).

Type. Egypt, Cairo ; *Delile* (P, K !).

KUWAIT. Above Kasur on Dhahar ; 120 m. ; *al hashma* ; gypsum hillocks ; a plant resembling *ragrug*, but with hairy leaves and small five-petalled yellow flowers, woody stem and root ; also common in Hajara ; 7 Apr. 1935, *Dickson* 187.

ARABIA. Dhahran ; 90 m. ; on small rocky hills in vicinity of camp, mostly limestone outcrops ; very bushy plant 6 ins. high with grey leaves and many flower buds ; in process of drying flowers appeared yellow in colour ; 3 Apr. 1942, *Dickson* 483.

Distribution. Morocco, Algeria, Tunisia, Cyrenaica, Egypt, Palestine, Transjordan, Arabia.

54. *Helianthemum ledifolium* (L.) Mill. Gard. Dict. ed. 8, n. 20 (1768) ; Grosser in Pflanzenreich, Cistac. 101 (1903).

Cistus ledifolius L. Sp. Pl. 527 (1753).

Type. Montpellier (cult. Hort. Ups.—Linn !).

KUWEIT. Arafjan ; Mar. 1933, *Dickson* 19. Arafjan ; 1935, *Dickson* 19 A. Arafjan ; *jerait* ; somewhat dry sandy soil and sometimes on stony ground : plant has a drooping head of buds and pale yellow flowers with deeper yellow markings at the base of each petal ; the flowers close about 10.30 a.m. ; 28 Feb. 1935, *Dickson* 173. Arafjan ; dry ground ; 28 Feb. 1935, *Dickson* 173 A. Arafjan ; *jerait* ; dry ground ; a small erect rock rose with pale yellow flowers without any dark markings as in 173, and no drooping buds ; 28 Feb. 1935, *Dickson* 173 B.

Distribution. Widespread on both sides of the Mediterranean from the Iberian Peninsula to Persia and Iraq, but evidently very rare in Cyrenaica and Egypt and southernmost Palestine.

The specimen in the Linnean herbarium is a single unbranched plant, with calyx-lobes 1.4 cm. long, capsule 1 cm., pedicel 5 mm. The nearly ripe fruits of some of the Kuwait specimens seem to indicate that they belong to var. *microcarpum* Coss. ex Willk. (Ic. Pl. Eur. Austr.-Occid. 2 : 87, t. 121. 1856).

This species is recorded for "Arabia petraea" (coll. *De Laborde*) by Blatter. As in *H. salicifolium* (L.) Mill. the Kuwait locality is on the southern edge of the Iraq-Persian area.

55. *Helianthemum lippi* L. *Dum. Cours. Le Botaniste Cultivateur*, 3 : 130 (1802) ; Pers. Syn. 2 : 78 (1807) ; Grosser in Pflanzenreich, Cistac. 98 (1903).

Cistus lippi L. Mant. alt. 245 (1771).

Type. Egypt (Linn !).

KUWEIT. Arafjan ; *rugrug* ; Mar. 1933, *Dickson* 9 ; 1935, *Dickson* 9 B. Ras Kaliya, 40 miles S.E. of Kuwait ; 18 m. ; sandstone cliffs above the sea, growing out of crevices ; a woody stemmed plant of the rock rose type with buds only, no flowers out yet ; 25 Apr. 1934, *Dickson* 146. Zor Hills ; *Cox* 35.

ARABIA. Dubai ; rocky limestone ; bushy growth, yellow flowers ; 10 Mar. 1937, *Holmes* (*Dickson* 337 H). On road to Hofuf, S. of Abqek oil camp ; on sandy ground where rain had recently fallen ; 23 Mar. 1947, *Dickson* 560. Sumaan district, about half way between Kuwait and Riyadh ; found sparingly ; 24 and 25 Feb. 1865, *Pelly*. About 60 miles N. of Riyadh ; stony places ; 1 & 2 Mar. 1865, *Pelly*.

Distribution. S. Italy, Sicily ; North Africa from Morocco to Egypt and Sinai ; Transjordan, Syria, Arabia, Iraq, Persia, Baluchistan.

In the Linnean herbarium there is a specimen of this plant labelled *Cistus heteroclitus* in Linnaeus's hand ; to this the word "*Lippii*" has been added by Sir J. E. Smith. The name *C. heteroclitus* was never published by Linnaeus and there is no doubt that this is the type sheet of *C. lippi* L. We have compared with it modern Egyptian material (e.g. *Keller* 80, from Abbassieh near Cairo) and find complete agreement.

forma staminibus numerosis ; a typo different staminibus 20-25 (nec 6-12).

KUWEIT. Arafjan ; *rugrug* ; 1935, *Dickson* 9 A.

The variation in number of stamens in this species is very interesting. The normal number appears to be 10-12, but cleistogamous flowers are well-known and in them the stamens are sometimes reduced to as few as 6. In *Dickson* 9 A the much greater number (20-25) at once suggests specific distinctness, but we have been unable to find other confirmatory characters. Superficially there is rather considerable difference between this plant and Mrs. Dickson's specimens of typical *H. lippi*, due in part at least to the flatter leaves and less intricate habit of the latter. All intermediate stages may, however, be found in material from other areas. The intricate habit of the plant closely approaches that of *Schweinfurth* 239 from Wadi Mar in the Arabian desert of Egypt, which has been ascertained to have 7-9 stamens.

In much of the herbarium material of this group the staminal number must remain in doubt as specimens are most often collected in fruit ; examination of some of the specimens cited above however has given the following numbers.

Dickson 9 B. Stamens 6 or 12, both on same plant.

Dickson 560. Stamens 8, after fertilization.

Schweinfurth 239. Stamens 7-9.

Dickson 9. Stamens 10, anthers free from stigma in bud.

Pelly, March 1865. Stamens 10, anthers free from stigma in bud.

Dickson 337. Stamens 11, anthers free from stigma in bud.

Keller 80. Stamens 11.

Dickson 146. Stamens 12, anthers tightly appressed to stigma in bud.

Dickson 9A. Stamens 20-25, flowers open, stamens spreading.

While no explanation of this variation can be given on such scanty data, one speculative idea may be mentioned. It was noted in dissecting *Dickson* 146 that the stamens were very closely appressed to the stigma in the bud stage. Could it be that this plant is really a cleistogamous form (and therefore with fewer stamens) of the 20-25 stamened type and not the normal chasmogamous *H. lippi* which reduces to about 6 stamens when it becomes cleistogamous ?

56. *Helianthemum salicifolium* (L.) Mill. Gard. Dict. ed. 8, n. 21 (1768) ; Grosser in Pflanzenreich, Cistac. 104 (1903).

Cistus salicifolius L. Sp. P. 527 (1753).

Type. Portugal and Spain (cult. Hort. Ups.—Linn !).

KUWEIT. Arafjan ; *jerait* ; Mar. 1933, *Dickson* 18 and 136. Arafjan ; *jerait* ; 1935, *Dickson* 18 A. Zor Hills ; *Cox* 64.

Distribution. Widespread from the Iberian Peninsula along the north of the Mediterranean reaching Switzerland (Valais) and the Crimea. Southwards from Spain it is found in Morocco, Algeria and Tunis. In the eastern Mediterranean it occurs in Asia Minor and Cyprus and from Palestine to Persia and N. Arabia.

The distribution of this species is interesting as it is evidently a northern Mediterranean type. The stations in Tunis and Palestine are only linked in the Kew herbarium by a solitary Egyptian specimen collected between Matruh and Barrani (*Shabetai* F. 4719). The Kuwait station is clearly on the southern edge of the Iraq-Persian area and the species is not found elsewhere in Arabia.

POLYGALACEAE

57. *Polygala erioptera* DC. Prod. 1 : 326 (1824) ; Chodat, Monogr. Polygal. 2 : 342 (1893).

Type. From "Senegal and Egypt" (G—not seen).

ARABIA. Dhahran ; 75 m. ; sandy stony slope below camp ; straggling plant with small two petalled drooping flowers along stem, pinkish green in colour ; 29 Mar. 1942, *Dickson* 467.

Distribution. Cape Verde Islands, tropical Africa from Senegal and Sudan to S. Rhodesia and Angola ; Egypt, Arabia, Baluchistan, India, Burma.

There is in this species a considerable variation in the size and form of the whole plant and of the leaves. Chodat (l.c.) recognised a number of different varieties, but there seems to be so much intergrading from one form to another that we prefer not to take up these divisions. From the material at Kew we have noted that the plant varies from being low and decumbent with small broad almost ovate leaves, through a form having an erect stem with decumbent branches at its base, the leaves on the erect stems being linear, to the tall erect often woody (but still annual) type with linear and in many cases often very narrow leaves. The degree of hairiness of the stems, leaves and wings varies considerably through the species.

Dickson 467 is a tall erect woody plant without decumbent branches, and has the narrow linear type of leaf, hairy stems and ciliated margins to the sepals.

FRANKENIACEAE

58. *Frankenia pulverulenta* L. Sp. Pl. 332 (1753) ; Summerhayes in Journ. Linn. Soc. Bot. 48 : 386 (1930).

Type. Not precisely designated.

KUWEIT. Arafjan ; sea level ; dried up beds of lakes and on salty ground around edges ; a small plant with clumps of small green leaves and purple flowers ; the leaves sometimes turn a reddish colour ; height 2-3 ins. ; Apr. 1935, *Dickson* 226.

ARABIA. Dubai ; sea level ; on rather salt sand ; pale rose pink flowers, small spreading growth ; 23 Mar. 1937, *Holmes* (*Dickson* 352 H).

Distribution. From Portugal to S. Russia and the Caucasus ; Canary Islands, from Morocco through Egypt to N.W. India and Central Asia ;

Cape Verde Islands and Senegal ; S. Africa. Introduced into England, Australia and Norfolk Island.

The habit of this plant varies from being a small dwarf decumbent form having leaves with revolute margins, to one much larger and laxer with trailing procumbent stems and flat leaves. *Dickson* 226 and 352 H are both of the small form.

Modern Pharmacognosy*. Three quarters of a century have gone by since Flückiger and Hanbury co-operated in the writing of their classical work on vegetable drugs, the *Pharmacographia*. A perusal of its pages brings home the intimacy with which the story of drugs is interwoven with the progress of history and the advance of human knowledge.

The *Pharmacographia* records the progress of many centuries of slow and patient work, but when it was published at the threshold of the last quarter of the nineteenth century, the pace was already beginning to quicken. In the intervening years, progress has been in geometrical progression so that the main advances reflected in the latest edition of Trease's Textbook are crammed into the last two decades. The application of quantitative methods such as those depending upon stomatal numbers, vein islet numbers and palisade ratios, fall into this period, while the estimation of the extent of adulteration in powdered drugs by the *Lycopodium* spore method is but little older. These, as well as other modern techniques including fluorescence analysis and chromatography are discussed in separate chapters.

The Monographs on individual drugs, which constitute the bulk of the Volume, follow in the high tradition set by the *Pharmacographia*. They are accurate and informative, and precise references to recent research are frequently appended as footnotes. A point of interest to botanists is the arrangement of the monographs in systematic order, according to Rendle's classification, perhaps the only occasion on which his system has been applied in an economic work. A number of well chosen photographs enhance the interest for students and numerous line drawings clarify points of morphology and anatomy. The necessity for a fifth edition is sufficient evidence of the appreciation of the book by students, but it is equally valuable as a work of reference. There is comparatively little difference from earlier editions, but the opportunity has been taken to enlarge some of the monographs on important drugs and generally to bring the text up to date. An innovation is the addition at the head of the monographs of French, Spanish and German names for most of the drugs.

R. MELVILLE.

*Textbook of Pharmacognosy by G. E. Trease. Baillière, Tindall and Cox, Ed. V, 1949, pp. 811. Price 30s.



Globularia davisiana Schwarz.

A NEW ANATOLIAN GLOBULARIA.

OTTO SCHWARZ (Weimar).

Globularia davisiana O. Schwarz sp. nov.

Frutex erectus (?) vel \pm dependens usque ad 100 cm. longus in trunco ramisque vetustioribus cortice tenui intertextim fibroso-fisso obtectus, ramis tenerrimis gracilibus crebre foliosis instructus. *Folia* tenuia non perhiantia, in ramulis fertilibus remota apicem versus decrescentia, in sterilibus \pm rosulariter approximata, plana, opaca, minute dense punctata et calcareo-lepidota; lamina suborbicularis usque obovato-lanceolata, obtusa saepius emarginata usque acuminata, semper minutissime sed distincte apiculata, ca. 10-22 mm. longa, vix ultra 18 mm. lata, in petiolum gracilem 10-22 mm. longum \pm alatum subito contracta vel angustiorae sensim decurrentes, nervo mediano subtus prominulo percursa, nervis lateralibus vix conspicuis. *Capitula* in foliorum supremorum axillis confertim approximata vel unicum tantum terminale, sessilia, ovata usque cylindrica, 4-15 mm. longa, vix ultra 4 mm. lata, receptaculo elongato cylindrico-conico statu deflorato longe perennante quasi spinescente. *Involucri squamae* late ovato-lanceolatae, paucae, acutiusculae; *paleae* ovatae vel suborbiculares, breviter acutatae, ut squamae dorso margineque dense villosa-hirsutae. *Calycis* bilabiatae plano-compressae tubus latus, margine nervisque dense patentim villosa-ciliatus, facie villosulus; dentes labii superioris 3, tubi dimidiam partem subaequantes, lanceolati, villosa-ciliati; labii inferioris dentes paulo breviores, anguste triangulares, minus ciliati. *Corollae* pallide caeruleae bilabiatae labium superum lobis 2 anguste linearibus recurvis bifidum; labium inferum ad vel supra medium trifidum lobis late linearibus apicem versus sensim acutatis. *Nucula* minuta, ovato-conica, subtrigona.

TURKEY: S.W. Anatolia. Vilayet Antalya; in fauce "Kesme Boğaz" prope Kemer, ad rupes verticales calcareas, ca. 60-100 m., 14 Aug. 1947, P. H. Davis 14055 (Typus in Herb. Hausskn.: Dupl. in Herb. Kew.). Tahtali Dağ (prope Kemer), in scopulis infra Çukur Yayla, ca. 1600-1800 m., 17 Aug. 1947, Davis 14150 (fruticuli omnino capris putati).

This very surprising new species belongs, without any doubt, to the sect. *Polycephalum* Schwarz (see Engler Bot. Jahrb. 69: 330. 1938), the two species of which—*G. orientalis* L. and *G. sintenisii* Hausskn. et Wettst.—are entirely confined to the steppe districts of interior and eastern Anatolia. In this section the new species is distinguished by its rather tall shrubby habit, the fine and slender remotely leaved twigs, which, like the leaves, are densely stippled with minute calcareous scales, and the ovate or oblong-cylindrical heads forming condensed racemes at the tips of the twigs; the small scales of the capitula are scarcely distinguishable from the broad flower-bracts, their dense villosity producing a silver-greyish glittering of the heads. It is distinguished further by the long pectinate ciliation of the villous calyx, and the structure of the bifid upper lip of the corolla which has nearly threadlike reflexed lobes, narrow and hornlike; the lower lip is rather deeply and narrowly split into 3 acute and deflexed lobes. The "terminal" head, which is really pseudo-terminal because of its position in the axil of a reduced leaf, is usually twice

as long as the "lateral" ones and, therefore, of cylindrical shape ; in weaker twigs it is generally the only one developed. The axis of the heads, the "receptaculum", becomes woody with time and, after the fall of the flowers, persists like a short spine at the tips of the dead twigs, the flower-bearing part of the twigs dying away after flowering and the new flower shoots arising from buds axillary to the lower non-flowering leaves. The vascular bundle of the central nerve of the leaves does not differ from the typical one of subgen. *Jasionopsis* wherein the sect. *Polycephalum* is included.

The new species, an inhabitant of vertical limestone cliffs, probably of northern exposure, was found by the collector within an area of entirely mediterranean vegetation. Normally this would not require particular mention as the genus, on the whole, is one of the most characteristic members of the mediterranean element ; but in this case it is of special significance because the area of its nearest relatives is typically that of the steppe. *G. davisiana*, with its elongated heads and well developed receptacle, its leafy twigs and shrubby habit, is certainly one of the most primitive types of the genus. It links the two other species of the section, with their rather arid distribution to the mediterranean centre of the genus. Regarding the shape of the leaves and the structure of the flowers, the now enlarged section shows certain affinities with sect. *Carradoria* and sect. *Aphyllanthes*, the first being endemic to the northern Appennines, the second having its centre of development in Spain. Of the 23 species of the genus Spain contains 8, Italy 7 and Asia Minor 6, which means a nearly equal participation in the distribution of this highly relict genus, these 3 regions being relict centres of equal importance for the European preglacial flora. From this point of view Mr. Davis's discovery is of great importance for the plant geography of the Mediterranean, and it is fitting that it should bear the name of this zealous and successful young botanist.

TWO CONFUSED ASIATIC GENTIANS.

J. ROBERT SEALY.

In September 1948 a flowering specimen of a twining gentian, raised from seeds collected in Assam by F. Kingdon Ward, no. 16020, was received from the Royal Horticultural Society's Gardens at Wisley, for naming. It was quickly identified as the *Crawfurdia fasciculata* of Hooker's Flora of British India, 4, 107 (1883), and was clearly the same as the plant figured under that name in the Botanical Magazine, t. 4838 (1855). But on checking the identification with the original account of *C. fasciculata* Wallich it was found that this covered two distinct plants, and investigation showed that our plant was not the one to which the name *C. fasciculata* Wall. was first restricted. It became evident that the nomenclature of the two species concerned had been greatly confused, and that the earliest name for one of them had been completely neglected. As the matter is somewhat involved, the following notes on the history of the two plants may be helpful.

The first mention of either of them was by David Don who described (Prodr. Fl. Nepal. 126 : 1825) a specimen collected in Nepal by Wallich as *Gentiana volubilis*. The type of this name is probably the specimen in the British Museum Herbarium with the field-label, in Wallich's handwriting, which reads "Gentiana ? volubilis Wall. E. Napalia 1818". In 1826 Wallich gave an account of a new genus of *Gentianaceae* which he named *Crawfurdia* (Tent. Fl. Nap. Ill. 63-64, t. 47-8). It comprised two species, *C. speciosa* Wall. (p. 64, t. 48), which is quite straightforward and is now known as *Gentiana speciosa* (Wall.) Marq., and *C. fasciculata* Wall. (p. 63, t. 47) which can be shown to be compounded of two distinct species. It is with the two latter that we are here concerned. The description and figures of the flowering shoots and flowers (fig. 1-5) are of a plant identical with that which D. Don named *Gentiana volubilis*, whereas the description and figures of the fruits and seeds (fig. 6-13) represent a different species. Of the composite species *C. fasciculata*, Wallich says "I collected it on Mt. Sheopore [Nepal], flowering in September and October. Also I have it from the Pundua mountains [Khasia], flowering and fruiting in December." Neither gathering was formally indicated as the type. Wallich subsequently realised that he had confused two species under the name *C. fasciculata*, and in his "Catalogue" p. 153 (1831) he discriminated them thus :

"4369 *Crawfurdia fasciculata* Wall.
Napalia 1821.

4370 *Crawfurdia affinis* Wall. .
Crawf. fasciculata Wall. Tent. Nepal.
Mont. Sillet F.D."

No. 4369 is evidently the plant which Wallich had previously said he himself had collected on "Mt. Sheopore", while no. 4370 is the plant from the "Pundua" mountains. Thus in his "Catalogue" Wallich restricted the name *Crawfurdia fasciculata* to his own Nepal plant, and renamed as *C. affinis* the Khasia plant collected by F. de Silva.* Clearly

*For information about the Khasia localities cited by Wallich, see C. B. Clarke in Kew Bull. 1913, p. 260-1.

then no. 4369 is the lectotype of the name *Crawfurdia fasciculata* Wall., while no. 4370 is the type of the name *Crawfurdia affinis* Wall. The question whether the name *C. affinis* is valid or not, need not concern us, since the epithet *affinis* is preoccupied in *Gentiana* by *G. affinis* Griseb., nor for the present need we adopt the earlier *G. volubilis* in place of *C. fasciculata*. It will be more convenient to refer to the two species by Wallich's names. That they are indeed well-marked species will be evident from the following diagnoses.

C. fasciculata : calyx-tube 6-8 mm. long, generally shorter than the segments which are 7-11 mm. long ; corolla 2.5-3 cm. long, white with green bands ; style 6-7 mm. long ; fruit red, succulent ; Himalayas (Jaunsar to Bhutan), Assam, N. Burma.

C. affinis : calyx-tube 11-14-(17) mm. long, longer than the segments which are 5-9 mm. long ; corolla 3.5-4 cm. long, purplish-blue ; style 1.8-2.3 cm. long ; fruit pale buff coloured when dried and capsular ; Assam (Khasia and Lushai Hills).

Wallich's separation of these two species in 1831 was not endorsed by other botanists during the next forty years or so. Thus David Don (in Trans. Linn. Soc. London, **17**, 518 : 1837, reduced *C. affinis* to *C. fasciculata* and added his own *Gentiana volubilis* as another synonym†, while Grisebach (Gen. et Sp. Gentian. 306 : 1839 ; et in DC. Prodr. **9**, 120 : 1845) and Hooker (in Bot. Mag. sub t. 4838 : 1855) took a similar line. The plant actually figured at t. 4838 was, in fact, *C. affinis*.

Eventually, however, C. B. Clarke recognised that two different plants were being confused under the name *C. fasciculata*, and in Journ. Linn. Soc. London, **14**, 442-3 (1875) he separated them as distinct species. Unfortunately, for some reason which is not apparent, Clarke used the name "*Crawfurdia fasciculata* Wallich in DC. ix. p. 120, *partim*" for the Khasia plant (i.e., for *C. affinis* Wall.), and very particularly excluded the Nepal plant (i.e. the true *C. fasciculata* Wall. emend. Wall.), stating (p. 433) : "Neque in Nepalia. Specimina Wallichiana sub nomine *Crawfurdiae fasciculatae* in Nepalia lecta ad *Crawfurdiam luteo-viridem* referenda sunt." Clarke did not enumerate any specimens under *C. fasciculata*, nor did he cite *C. affinis* as a synonym. The latter is, however, included in the work to which Clarke referred, namely DC. Prodr. **9**, 120, where one Khasia specimen is mentioned, Wall. Cat. no. 4370. Since Clarke attributed the name *C. fasciculata* to "*Wallich in DC. ix. p. 120, partim*" Wall. 4370 could well be regarded as the type of the name *Crawfurdia fasciculata* Wall. emend. Clarke. In view of the previous typification of the name *C. fasciculata* Wall. by Wallich himself in 1831, Clarke's work can have no standing. In fact, since Clarke so clearly and unequivocally excluded the lectotype of the name *C. fasciculata* Wall. from the species for which he used that name, *C. fasciculata* Wall. emend. Clarke must rank as a new name, distinct from *C. fasciculata* Wall. emend. Wall. As mentioned above, Clarke referred the latter to *C. luteoviridis* Clarke, a new species distributed "In omni Himalaya a Bhotan ad Kemaon . . ." As a synonym of this Clarke cited "*Wallich in DC. ix. p. 120, partim*" ; he did not mention *Gentiana volubilis*, but this is included in the work cited. It is scarcely necessary to say that not only

†An early example of the practice, later known as the "Kew Rule", whereby the correct name for a species was the one first given to it in the accepted genus.

is *C. luteoviridis* a synonym of the earlier *C. fasciculata* Wall. emend. Wall. and the still earlier *Gentiana volubilis* D. Don, but since it also includes the types of these two names it is also thoroughly illegitimate. Nevertheless *C. luteoviridis* became the established name for the species, and was used when it was figured in the Botanical Magazine, t. 6539, in 1881.

Matters became still more confused in 1883 with the publication of Clarke's account of *Crawfurdia* in the Flora of British India, 4, 107-8, for not only did he continue to use *luteoviridis*, now reduced to a variety of *C. japonica*, for the true *C. fasciculata*, and *C. fasciculata* for the true *C. affinis*, but he also had a third species, *C. affinis*, which is not the same as the original *C. affinis* Wall. (1831). For both his *C. fasciculata* and his *C. affinis* Clarke cited "*Wall. Cat. 4370, partly*". So far as his *C. fasciculata* is concerned, the reference is evidently to the sheet of 4370 in the Wallich Herbarium, that is, the type of the name *C. affinis* Wall.) which Clarke has determined as "*C. fasciculata*". The citation of "*Wall. Cat. 4370, partly*" for *C. affinis* by Clarke, is explained by the fact that in Hooker's herbarium a piece of the true *C. fasciculata* from the Wallich Herbarium (i.e. Wall. Cat. 4369) is mounted with the Wallich Catalogue label "*4370 Crawfurdia affinis Wall. . . .*"† Clarke has not identified this specimen—which is in keeping with his practice of not determining material that he accepted as correctly named—but he has identified as "*C. affinis*" an identical Wallich specimen from Bentham's herbarium which was originally named *C. fasciculata* Wall. As a synonym for his *C. affinis* Clarke cited "*C. fasciculata Wall. Cat. 4369 A*". I have been unable to trace this number; it may be a slip for 4369, for the sheet of 4369 in the Wallich Herbarium is determined as "*C. affinis*" by Clarke. The specimen is clearly labelled as *C. fasciculata* Wall. and its country of origin is given as Nepal, yet Clarke gave the distribution of *C. affinis* as Sikkim and Khasia. Clarke distinguished his *C. affinis* from *C. japonica* var. *luteoviridis* by the fruit being a dry and 2-valved capsule, not succulent, but he added "nevertheless it is to be feared that the species is merely a form of the next i.e. *C. japonica*". I fail to understand his remarks about the fruits, for those of Wallich 4369, though not mature, agree in all respects with comparable material of his var. *luteoviridis*. The fruits of Wallich 4370 are certainly dry and 2-valved, but the material is determined as "*C. fasciculata*" by Clarke. In addition to the Wallich material already mentioned, Clarke has attached the name *C. affinis* to certain specimens from Sikkim, Darjeeling and Assam. These agree with the true *C. fasciculata* (*C. luteoviridis* of Clarke) in size and colour of the corollas, in the short styles, and, so far as one can judge from dried specimens, in the fruits, but they differ in having larger calyces (tube 8-11 mm. long, segments 9-13-17 mm. long) and slightly longer styles (often 7-9 mm. long though sometimes 6 mm.). I have no hesitation in referring these specimens to *C. fasciculata* Wall. sens. str., so that the whole of the material which Clarke included under his *C. affinis* is referred to that species. *C. affinis* Clarke (non Wall. 1831) thus becomes, like *C. fasciculata* Wall. emend. Wall. (1831) and *C. luteoviridis* Clarke, a synonym of *Gentiana volubilis* D. Don.

†In Herb. Hooker there is also a piece of the true *C. affinis* from the Wallich Herbarium, i.e. no. 4370, but with this is mounted the label from the Wallich Catalogue of "4367 *Canscora sessiliflora* Schultes . . .". Evidently there was some confusion of labels when the Wallich specimens were mounted in Hooker's Herbarium.

We now come to the last phase in the history of these plants—their transference to *Gentiana* by Marquand (Kew Bull. 1931, p. 70). This followed from Marquand's reduction of *Crawfurdia* to *Gentiana*, which entailed the making of new combinations or the provision of new names for all the accepted species of *Crawfurdia*. Among the new combinations was *Gentiana luteoviridis* (C. B. Clarke) Marq. based on *Crawfurdia luteoviridis* C. B. Clarke, which Marquand correctly recognised as being a distinct species, though he failed to notice that the oldest name for it was *Gentiana volubilis*. For "*Crawfurdia affinis* C. B. Clarke in Hook. fil. Fl. Brit. Ind. iv. 107 which was founded in Wall. Cat. 4370 *pro parte*", Marquand proposed the name *Gentiana confusa*, owing to the existence of a *Gentiana affinis* Griseb. Though he correctly attributed the name *Crawfurdia affinis* to Clarke, which suggests that he may have known that it was not the same as *C. affinis* Wall., Marquand can scarcely have looked into the identity of the "species" at all critically or he must have realised that it could not be maintained as distinct from *C. luteoviridis*.

Finally there is *Gentiana fascicularis* Marq., the original citation for which is as follows :

"***Gentiana fascicularis*** Marquand, nom. nov., is proposed for *Crawfurdia fasciculata* Wall. Tent. Fl. Nap. 63, t. 47. The specific epithet has been employed for a Formosan species, *Gentiana fasciculata* Hayata in Journ. Coll. Sci. Tokyo, xxv. Art. 19, 165."

The question "what is the type of the name *Gentiana fascicularis* Marq. ?" has proved most troublesome. The first point to notice is that the publication of the name does not stand by itself, but forms part of a comprehensive renaming of all the accepted species of *Crawfurdia* on their transference to *Gentiana*. At the time that Marquand did this, he was principally concerned with the Chinese species of *Gentiana*, and it is evident that for the Indian species of *Crawfurdia* he followed Clarke's arrangement in the Flora of British India. Except for the little-known *Crawfurdia puberula* Clarke, of which there is apparently no specimen at Kew, Marquand supplied names for all the species recognised by Clarke, and *Gentiana fascicularis* is obviously the name for Clarke's *Crawfurdia fasciculata*, that is, for *C. fasciculata* Wall. emend. Clarke (1875), non Wall. emend. Wal. (1831). This is borne out by Marquand's identifications in the Kew Herbarium and by his use of the name *Gentiana fascicularis* in Kew Bull. 1937, p. 140, 156. The type of the name *Gentiana fascicularis* would therefore be, one might suppose, the type of the name *Crawfurdia fasciculata* Wall. emend. Clarke, that is Wallich 4370.

Mr. B. L. Burtt and Mr. H. K. Airy Shaw, who have been kind enough to look into the question, are, however, of the opinion that this would be contrary to the spirit of the International Rules of Botanical Nomenclature. Mr. Shaw explains their view thus :

"The International Rules make no specific provision for a case such as the present, but it would seem logical to apply the principles governing new combinations based on misidentifications. These are embodied in Art. 54, second paragraph : 'When the specific epithet, on transference to another generic name, has been applied erroneously in its new position to a different species, the combination must be retained for the plant on which the epithet was originally based'. If Marquand had been at

liberty to use the epithet *fasciculata* under *Gentiana*, he would presumably have made the combination '*Gentiana fasciculata* (Wall.) Marq.', and applied it to *Crawfurdia affinis* Wall. ; but under Art. 54 that combination could only have been used for *Crawfurdia fasciculata* Wall. (the type of which had already been indicated by Wallich) ; it could not have been transferred to *Crawfurdia affinis*. As it was, Marquand felt himself obliged to coin a new name, which he (following Clarke) then applied to *C. affinis* ; but the circumstance that led him to coin the name was not primarily that a species, *C. affinis*, was without a name, but that a name, *Gentiana fasciculata*, was preoccupied. The new name, *Gentiana fascicularis* Marq., was therefore a substitute for the unusable combination *Gentiana fasciculata*, and, in the spirit of Art. 54, the position is not affected by the fact that Marquand and Clarke, having overlooked Wallich's typification of the name *Crawfurdia fasciculata*, used this name for a different species. It seems very important in this case to distinguish between species and names. Mr. B. L. Burtt, to whom I am indebted for helpful discussions on this point, is in substantial agreement with the foregoing."

The soundness of this argument cannot be denied. The validity of the underlying assumption, namely that the problem is one that should be dealt with in the same way as a new combination based on a misidentification, is, however, a debatable point and I am not satisfied that it is admissible. I agree with Messrs. Shaw and Burtt, that had Marquand been free to make the new combination *Gentiana fasciculata* (Wall.) Marq., the type of that name would have been Wallich 4369, since this is the lectotype of the name-bringing synonym *Crawfurdia fasciculata* Wall. The new combination would have been superfluous and misapplied, but this would merely have been unfortunate. In point of fact, however, Marquand did not make a new combination, he proposed a new name, and while it is logical to insist that the type of a new combination should be the type of its name-bringing synonym, it seems difficult to justify the extension of this principle to new names, and to say that the type of a new name must necessarily be the type of another, and different, name cited as a synonym, even in an example such as the present one where the description of the synonym alone validates the new name. Where the validating description rests on one collection only, there can be no argument about that plant being the type of the new name, as it was of the synonym. But in instances where the validating description is drawn from two or more different plants, there seems no reason why the type of the new name should inevitably be the specimen which is the type of the synonym. This is especially so in an example like the present one, where acceptance of the type of the synonym as the type of the new name would render the latter superfluous and transfer it from the species for which it was intended to another and quite different species. Mr. R. D. Meikle, who has most kindly scrutinised the arguments put forward about the typification of the name *Gentiana fascicularis*, points out—as indeed Mr. Burtt had also done—that whatever Marquand's intention, his name *Gentiana fascicularis* is formally validated by the description and figure in Wallich, Tent. Fl. Nap. Mr. Meikle also points out that from a "legal" standpoint supplementary evidence about Marquand's intentions carries no weight in face of his formal proposal of *Gentiana fascicularis* as a new name for *Crawfurdia fasciculata* Wall. Tent. Fl. Nap. 63, t. 47, and that from that standpoint also the invocation of Art. 54 is both unnecessary and irrelevant.

If the formal publication of the name *Gentiana fascicularis* Marq. be taken at its face-value, that name must be accepted as covering both plants included in Wall. Tent. Fl. Nap. 63, t. 47, that is Wallich 4369 (from Nepal) and 4370 (from Khasia), the inference being that Marquand regarded these as conspecific, just as all botanists had done during the period 1837-1875. As the two plants are now regarded as distinct species, the name *Gentiana fascicularis* must be restricted to one of them, and since Marquand did not indicate either as the type of his name, one of them must be chosen as lectotype. This would not be true if one accepts the argument put forward by Mr. Shaw, for it could then be said that, since *Gentiana fascicularis* Marq. was a new name for *Crawfurdia fasciculata* Wall. made necessary by the fact that the epithet *fasciculata* was preoccupied in *Gentiana*, the type of the name *Gentiana fascicularis* should be the type of the name *Crawfurdia fasciculata*, i.e. Wallich 4369. As explained above, I am not satisfied that this argument is valid, and it therefore seems desirable to choose a lectotype. Reference to the description and illustration which validate the name *Gentiana fascicularis*, shows that the description of the flowers and the greater part of the plate refer to 4369, while the descriptions and figures of the fruits and seeds belong to 4370. This suggests that 4369 would be the better choice for lectotype. But if 4369 is chosen, the name *Gentiana fascicularis* immediately passes into synonymy, for 4369 is clearly referable to *Gentiana volubilis*, and a new name would be required for 4370. If the right of choice is conceded, it should obviously be exercised in such a way that the result is in keeping with the principles and spirit of the International Rules. Since one alternative lectotype, 4369, already has a valid name in *Gentiana*, it seems logical to retain *Gentiana fascicularis* for the other alternative, 4370. I therefore propose to accept 4370 as the lectotype of the name *Gentiana fascicularis* Marq., which means that the name will be used for the species for which it was intended, namely the one described in the Flora of British India as *Crawfurdia fasciculata*.

In conclusion I should like to express my thanks to my colleagues Messrs. Burt, Meikle, and Shaw, for their help in discussing the question of the typification of the name *Gentiana fascicularis*. Their remarks contributed materially to the clarification of the issues involved, and have enabled me to give a fuller account than I should otherwise have done.

Diagnoses and synonymy of the two species are given below, with lists of the exsiccatae.

Gentiana volubilis D. Don, Prodr. Fl. Nepal. 126 (1825) a *G. fasciculari* Marq. quacum confusa, tubo calycis 6-11 mm. longo segmentis 7-13- (17) mm. longis plerumque brevioribus, corolla 2.5-3 cm. longa alboriviridi, stylo multo brevioribus 6-9 mm. longo, fructu carnoso rubro valde discrepat.

Crawfurdia fasciculata Wallich, Tent. Fl. Nepal. Ill. 63, t. 47 (1826), descriptione iconaque fructus et seminum exclusa.

Crawfurdia fasciculata Wall. emend. Wallich, "Catalogue", 153 (1831).

Crawfurdia luteoviridis C. B. Clarke in Journ. Linn. Soc. London, **14**, 442 (1874); Bot. Mag. t. 6539 (1881).

Crawfurdia japonica var. *luteoviridis* (C. B. Clarke) C. B. Clarke in Hooker f., Fl. Brit. India, **4**, 108 (1883).

Crawfurdia affinis Wall. sensu C. B. Clarke in Hooker f., Fl. Brit. India, **4**, 107 (1883), non Wall. (1831).

Gentiana confusa Marquand in Kew Bull. 1931, p. 70.

Gentiana luteoviridis (C. B. Clarke) Marquand, l.c.

Himalayas. JAUNSAIR, Deoban, J. S. Gamble 27347. GARHWAL, Padma Khal, Edgeworth 100. KUMAON, Madhuri pass Strachey and Winterbottom 100. NEPAL: [Mt. Sheopare] Wallich (anno 1821) *Cat.* 4369; "E. Napalia" Wallich (Anno 1818)—typus; E. Nepal, Nangki, J. D. Hooker. SIKKIM: Lachoong, Oct. 2, 1849, J. D. Hooker; Sinchue, T. Anderson 811; Buckeem, C. B. Clarke 25313; Khursiong, C. B. Clarke, 36001; Nesbay (?) C. B. Clarke 25349. DARJEELING: C. B. Clarke 8832, 10298, 26249, 26470, 26768A, 26768B, 27050A, 27382; J. S. Gamble 3269A, 3271A, 9921, sine num. (8;1872); Drummond 20968, 21000; Treutler 284. BHUTAN, Griffith 470. ASSAM: Khasia hills, T. Lobb; Kohima, C. B. Clarke 41066A; Naga hills, Satoi, N. L. Bor 6762, Wokha Hill, N. L. Bor 6189; Lushai hills, Phongpui, N. E. Parry 575. N. BURMA: Nam Tisang Mali divide, 27° 30' N., 97° 50' E., F. K. Ward 7329.

Gentiana fascicularis Marquand in Kew Bull. 1931, p. 70, a *G. volubili* D. Don tubo calycis 11–14–(17) mm. longo segmentis 5–9 mm. longis longiore, corolla 3·5–4 cm. longa purpureoacerulea, stylo 1·8–2·3 cm. longo, fructu chartaceo 2-valvo differt.

Crawfurdia fasciculata Wallich, Tent. Fl. Nepal. Ill. 63, t. 47 (1826) quoad descriptionem iconemque fructus et seminum; Bot. Mag. t. 4838 (1855), excl. syn.

Crawfurdia affinis Wallich, "Catalogue" 153 (1831).

Crawfurdia fasciculata Wall. emend. C. B. Clarke in Journ. Linn. Soc. London, **14**, 443 (187), et in Hooker f. Fl. Brit. India, **4**, 107 (1883) non Wall. (1831).

ASSAM. Khasia hills: sine loc. F. de Silva (*Herb. Wall.* 4370)—typus, Mrs. Mack, Griffith 165, H. K. Nandi; Kala Panee June 27 et Oct. 28, 1850, et Joowye Sept. 28, 1850, et Myrung Oct. 17 et 24, 1850, et Maflung Oct. 26, 1850, J. D. Hooker and T. Thomson; Sohra, C. B. Clarke 15169, 15743; Tuablangwar C. B. Clarke 14431A, 14434. S. Lushai, Blue Mt., Wenger 366. Seinghku Valley, 28° 5' N., 97° 30' E., F. K. Ward 7440. Delei valley, 28° 15' N., 96° 35' E., F. K. Ward 8599.

THE UTRICLE OF *CAREX BINERVIS* SM. AND ITS TWO SUBMARGINAL RIBS.

E. NELMES.

A specimen of *Carex laevigata* Sm. was recently received at Kew for determination with the comment: "It seems to be near *Carex laevigata* but the fruits have two prominent green ribs, which indicates *C. binervis*".

Sir J. E. Smith first described *C. binervis* in Trans. Linn. Soc. 5 : 268 : 1800. In his English Flora, published some years later, he referred more fully to the fruit of this species as having "2 very distinct, elevated, smooth, green ribs towards the margin, though totally distinct from it, found perhaps in some other species, quite unlike this, but not in any which, properly examined, can be confounded with it, especially *C. distans*." Now, with due respect to the botanical acumen of Smith, this comparison of *C. binervis* with its allies is completely erroneous. Similar submarginal ribs are present in many species of *Carex*, but are particularly characteristic of close relatives of *C. binervis*, such as *C. laevigata* Sm., *C. distans* L., and *C. hostiana* DC. It is remarkable how an "authoritative" statement such as Smith's is sometimes uncritically accepted for many years—about 150 in this case. Several generations of British botanists must have examined the utricles of *C. binervis* and *C. distans*, many of them seeing the two prominent ribs of the former but either blinding themselves to those of the latter as Smith had done, or observing them but mis-identifying the species as *C. binervis*.

It may be of interest to add a word on the probable evolutionary history of the *Carex* utricle, which will explain the occurrence of the submarginal ribs in the genus. There seems no doubt that the utricle, a sac completely enclosing the achene in *Carex* and the related genus *Uncinia* but more or less split in the more primitive genera of the Tribe *Cariceae*—*Kobresia* and *Schoenoxiphium*—has been evolved from a prophyll. Certain other of these prophylls in the *Cyperaceae*, less modified than the utricle, have bilobed apices and correlated twin midribs. It seems clear that the prophyll that evolved into the utricle of the *Cariceae* was of this kind, and that its two midribs became the two "margins" of the utricle. Now, this bimarginal sac is often tightly filled by the mature achene, which is sometimes biconvex or plano-convex, with two angles, and sometimes trigonous, or 3-angled. Either by "accident" or "design" the biconvex and plano-convex achenes usually conform to their bimarginal utricles, the two angles of the achene coinciding with the two margins of the utricle. In many species with trigonous achenes, too, there is coincidence between two of the angles of the achene and the two margins of the utricle, the third angle forming a more or less central longitudinal ridge on the dorsal face of the utricle. In species such as *C. binervis*, *C. distans*, and others, however, owing to the width between the ribs of the utricle being greater than that between those two angles of the achene which in other species coincide with them, the margins are displaced to become the submarginal ribs on the dorsal face.

RESEARCHES ON *SILENE MARITIMA* AND *S. VULGARIS* : XXXI.*

BLADDER CAMPIONS OF THE FRENCH ALPS.

E. M. MARSDEN-JONES AND W. B. TURRILL.

In this paper we deal with field studies in the French Alps, in Dauphiné (Isère and Hautes Alpes), with analyses of samples from wild populations *in situ*, and with analyses of series of plants grown at Kew from wild localized seed.

Besides *Silene vulgaris* (*S. cucubalus*), in the sense in which we have so far used this name, there are two other names we have decided to use in this paper and, to avoid any confusion, it is necessary to comment on these before proceeding to describe our researches.

Silene glareosa Jord. Pugill. Pl. Nov. 31 (1852). This species, described by Jordan, was cultivated by that author from seeds collected "in glareosis montium Beugesi propè Lyon ubi haud infrequentem legi". Our material from near St. Nizier agrees quite well with Jordan's original description and, though we have not seen type material, we are satisfied to use the name *S. glareosa* for our stocks.

Silene alpina of various authors.

The name *S. alpina* is, unfortunately, nomenclaturally untenable for our high mountain material. We are here immediately concerned with plants collected in the French Alps and especially in the La Grave district, or with plants grown from seed collected in the same general area. These, by using various modern floras and lists and by comparison with much herbarium material would be determined as *Silene alpina* Thomas or as *S. alpina* var. *marginata*. *Silene alpina* Thomas, Cat. Pl. Suiss. 45 (1837) is a *nomen nudum*, and had a description been appended would still be a later homonym. Negodi [Studio monografico, sulla *Silene angustifolia* (Mill.) Guss. con particolare riguardo alle forme italiane, in Arch. Bot. **4**, 40-71, 138-153, 217-272 (1928) ; **5**, 23-45, 111-141 (1929)] places *S. vulgaris* (*S. cucubalus*, *S. maritima*, *S. glareosa*, *S. alpina*, etc., all in one composite species to which he gives the name *Silene angustifolia* (Mill.) Guss. We are not, at present, concerned with his classification but, as we have previously pointed out (K.B. 1933, 357), if *S. vulgaris* (*S. cucubalus*) and *S. maritima* (and other species) be united "*maritima*" appears to be the oldest valid trivial for the combined species. *E descriptione*, the La Grave plants of "*alpina*" type should, in large part at least, be designated *Silene angustifolia* (Mill.) Guss. subsp. *alpina* (Lam.) Neg. var. *uniflora* (Otth.) Neg., var. *marginata* (Kit.) emend. Neg., var. *hirsutiuscula* Neg. (perhaps), and var. *cryptopetala* Neg., in Negodi's classification.

We are in somewhat of a quandary. Till our researches on the group are completed we cannot be certain what our final conclusions as to taxonomic status, and consequently nomenclature, will be and we do not want to risk adding unnecessary names, even as new combinations, to the great burden of nomenclature in the group of the bladder campions. On the other hand, a tentative nomenclature is essential for precision and

*Continued from K.B. 1948, 276.

clarity of presentation. We are, therefore, using the name *S. alpina* (auct. plur.) for the low-growing, high mountain plants with 1-3-flowered inflorescences with which we are immediately concerned. Since we shall publish adequate descriptions of stock plants and have dried specimens of these deposited at Kew, there is no excuse for any confusion due to the use for an alpha taxonomy of a nomenclature which it is frankly stated does not strictly follow all the International Rules. Actually, the matter is of some general interest as a clear example of the need for taxonomy and nomenclature at every stage of biological research though the result of such research itself may necessitate changes in both.

FIELD NOTES AND SCORINGS OF SAMPLES FROM WILD POPULATIONS *in situ*.

The main objects of the field work were :

1. To examine the characters, and to determine their range, in *Silene glareosa*, *S. alpina*, and *S. vulgaris* in samples collected from populations growing *in situ*.
2. To collect specimens and seeds for growing for herbarium and experimental researches.
3. To obtain further data for examining the relationships between *S. alpina*, *S. glareosa*, *S. vulgaris* (s.s.), and *S. maritima*.
4. To find evidence for or against the hypothesis of the origin of the European bladder-campions in the Central European mountains.

***S. glareosa*.**

Near St. Nizier, above Grenoble, 1250 m., underlying rock limestone, 19.7.31.

On the borders of cultivated fields, along paths, and even in woods of conifers (*Picea abies* and *Abies alba*) plants definitely determined as *S. vulgaris* s.s. were common and had white immature seeds and tubercled mature seeds.

On limestone scree devoid of trees, and in parts even of shrubs, a very numerous population of *S. glareosa* occurred and the plants were in full flower. With the *Silene* plants the following species were growing : *Centranthus angustifolius*, *Sedum album*, *Campanula caespitosa*, *Thesium pratense*, and *Moehringia muscosa*. Important field diagnostic characters of *S. glareosa* are the more or less erect stems with few (usually 1 to 3) flowers and the relatively small narrow leaves. The population near St. Nizier was moderately uniform in habit. The same type of population occurs also on open limestone screes at 1350 m. (and probably at still higher altitudes) in mixed spruce, fir, and beech woods and is probably common on all limestone screes in the district.

A second visit was paid to the *S. glareosa* population at St. Nizier on 7.8.31 when numerous fruits and seeds were collected.

In several places at the junction of forest and open scree, populations of *S. vulgaris* s.s. (of the forest) and of *S. glareosa* (of the scree) met and, in a narrow belt between the two, plants were found intermediate in habit and leaf characters. Other species at the forest margin included : *Digitalis lutea*, *D. grandiflora* (and a hybrid between these two foxgloves), *Sambucus racemosa*, *Rubus idaeus*, *Lonicera alpigena*, *L. nigra*, *L. xylosteum*, *Spiraea aruncus*, and *Saxifraga rotundifolia*.

A summation of the scorings of 23 *S. glareosa* specimens collected on the two dates (19.7.31 and 7.8.31) follows.

Stem lengths. Range from 2.8 to 4.2 dm., with a mean of 3.34 dm.

Anthocyanin in vegetative parts. Much 13 : medium 5 : little 5.

Indumentum. All plants glabrous, except for cilia on leaf margins. These are sometimes well developed and sometimes absent.

Leaf-shape and size. There is some range in leaf shape and size but, with few exceptions, the leaves are narrow, from narrowly lanceolate or oblanceolate to linear or narrowly elliptic-linear, and acuminate to shortly acuminate. Sample measurements of well grown leaves in cm. are : 2.2 by 0.3 ; 2.1 by 0.6 ; 2.3 by 0.5 ; 2.4 by 0.5 ; 1.8 by 0.25 ; 1.2 by 0.3 ; 1.7 by 0.5 ; 1.4 by 0.25 ; 1.2 by 0.35 ; 2.3 by 0.6 ; 1.9 by 0.6. One plant (No. 2362) was outstanding in its leaf shape. The blades were elliptic or ovate-elliptic, shortly acuminate, 1.7 to 2.0 cm. long, 0.8 to 1.0 cm. broad.

Number of flowers. Range from 1 to 6, with a mean of 2.78 and a strong mode at 3. Only two plants had inflorescences with more than 3 flowers. Even where on a plant there were inflorescences with 3 or more flowers there were generally some also with only 1 flower.

Anthocyanin in calyx. Much 5 : medium 9 : little 9.

Calyx shape. Subinflated 18 : narrow 5.

Petal length. Range from 12 to 17 mm., with mean 15.52 (S.D. 1.50), and a mode at 16 mm.

Petal breadth. Range from 3 to 7 mm., with mean 4.35 (S.D. 1.09), and a mode at 4 mm.

Petal colour. More or less purple 13 : white 9.

Petal lobing. Bilobed 22 : multilobed 1.

Depth of lobing. 2/3-lobing 1 : 3/4-lobing 22.

Corona. Small scale 8 : boss 15.

Anthocyanin blotch. Some plants have petals with an anthocyanin blotch and some have none. It is not always possible to score this character in coloured petals.

Overlapping. Petals and segments do not overlap.

Sex. Hermaphrodite 19 : female 3 : hermaphrodite and female 1.

Filaments and anthers. All (when present) purple.

Stigmata. Purple 22 : white 1.

Immature seeds. Purple 16 : white 4.

Capsules. At least mainly, of *S. maritima* type.

Mature seeds. Both armadillo and tubercled types occurred, with the former in the majority.

Plants grown from wild seed.

I. Collected on lower limestone scree, near St. Nizier, 7.8.31. Original seed armadillo, weak armadillo, very weakly tubercled, weakly tubercled, and tubercled, from many different plants. Total of 135 plants grown and scored.

Stem lengths. Range from 1.0 dm. to 8.0 dm., with a mean of 3.79 dm.

Anthocyanin in vegetative parts. Much 27 : medium 72 : little 35.

Indumentum. Dense 1 : medium 1 : few hairs 1 : glabrous 128.

Leaves. Mostly linear-lanceolate to very narrowly elliptic, sometimes narrowly oblanceolate or narrowly elliptic. Sample measurements in cm. are : 2.8 by 0.4 ; 4.0 by 1.1 ; 1.3 by 0.4 ; 1.2 by 0.3 ; 1.5 by 0.25 ; 4.0 by 1.5 ; 1.6 by 0.2.

No. of flowers per inflorescence. 1 2, 2 6, 3 38, 4 6, 5 33, 7 34, 8 3, 9 1, 10 1, 11 1, 15 3, 17 1, 21 1.

Calyx shape. Inflated 10 : subinflated 57 : narrow 56.

Anthocyanin in calyx. Much 4 : medium 75 : little 47.

Petal colour. Pink 30 : white 96.

Lobing of petals. Bilobed 126.

Depth of lobing. 3/4-lobing 106 : 2/3-lobing 20.

Corona. Scale 2 : small scale 61 : boss 63.

Anthocyanin blotch. Present 33 : absent 93.

Petals and segments not overlapping 126.

Anthocyanin in anthers and filaments. 94.

Sex. Hermaphrodite 92 : female 34.

Stigmata colour. Purple 121 : white 4.

Immature seeds colour. Purple 97 : white 9.

Fruit shape. *S. maritima* type 102 : intermediate type 6.

Mature seeds. Tubercled 8 : weak tubercled 14 : weak armadillo 14 armadillo 74.

II. Collected on upper limestone screes, near St. Nizier, in mixed beech and conifer wood, 7.8.31. Original seed armadillo. Total of 68 plants grown and scored.

Stem lengths. Range from 1.5 dm. to 6.7 dm., with a mean of 3.66 dm.

Anthocyanin in vegetative parts. Much 6 : medium 44 : little 16.

Indumentum. Dense 1 : medium 1 : glabrous 61.

Leaves. Length : range 13 to 37 mm. with mean of 19.71 mm. (S.D. 5.81). Breadth : range 2 to 14 mm. with mean of 5.23 mm. (S.D. 2.40). Correlation of length with breadth, $r = 0.55$.

No. of flowers per inflorescence. 2 2, 3 21, 4 2, 5 12, 6 7, 7 9, 8 1, 9 2, 10 1, 11 1, 12 1, 13 1, 14 1. Mean 5.33 (S.D. 2.71).

Calyx shape. Inflated 15 : subinflated 28 : narrow 18.

Anthocyanin in calyx. Much 1 : medium 46 : little 14.

Petal size. Length : range from 10 mm. to 18 mm. with mean of 15.02 mm. (S.D. 1.52). Breadth : range from 2 mm. to 7 mm. with mean of 4.75 (S.D. 1.01). Correlation of length with breadth : $r = 0.49$.

Petal colour. Purple 1 : pink 23 : white 37.

Lobing of petals. Bilobed 60 : entire 1.

Depth of lobing. 3/4-lobing 47 : 2/3-lobing 9 : 1/2-lobing 1 : 1/4-lobing 2 : 1/16-lobing 1 : 0-lobing 1.

Corona. Small scale 11 : boss 50.

Anthocyanin blotch. Present 22 : absent 37.

Petals and segments not overlapping 61.

Anthocyanin in anthers. Purple 55 : yellow-green 1.

Anthocyanin in filaments. Purple 56.

Sex. Hermaphrodite 53 : female 7 : hermaphrodite and female 1

Stigmata colour. Purple 60 : white 1.

Immature seeds colour. Purple 45 : white 5.

Fruit shape. *S. maritima* type 55 : intermediate type 4.

Mature seeds. Tubercled 2 : armadillo 60.

***S. alpina*.**

The distinctive characters of plants referred to here under this name are : the relatively prostrate habit and low growth, 1-3 (rarely more)—flowered inflorescences and the small leaves. This is the typical high mountain open scree bladder campion of the French Alps and populations were studied in two distinct habitats: 1. on granitic glacial scree (Mt. Pelvoux and at the end of the Meije glacier) ; 2. calcareous schistose scree (opposite La Grave and in several other places along the valley of the La Romanche).

I. Above Ailefroide, 21.7.31. On the lateral foot of Mt. Pelvoux, immediately below the union of Glacier Noir and Glacier Blanc, just above 2000 m., in rather wet granitic glacial scree. *S. alpina* occurred in abundance on the sandy and pebbly half-stabilized scree. It did not occur on the very steep lateral scree, except where these were more or less stabilized. The accompanying vegetation was of a very open type with : *Sempervivum arachnoideum*, *Adenostyles albifrons*, *Silene acaulis*, *Alchemilla alpina*, *Rumex arifolius*, *Saxifraga hypnoides*, *Biscutella* sp., and *Epilobium* sp.

The *S. alpina* plants here had mostly 1- to 3-flowered inflorescences, all with zygomorphic flowers. Most of them were hairy with medium to much anthocyanin in vegetative parts and calyces, though a few were yellow-green. The habit was generally prostrate but a few had more or less erect stems. Purple, pink, and white-flowered plants occurred with petals and segments always not overlapping. Sometimes there was no trace of a corona but usually there was a boss to small scale. Fully developed scales of *S. maritima* type were never seen.

In this locality and habitat *S. alpina* seemed to prefer the wetter scree and there were fewer plants in the drier places. Some plants had been washed halfway down to the lower river valley and occurred in stream gravel where this was partially stabilized. This recalled the occurrence of *S. maritima* in some of the lower reaches of Welsh rivers.

A summation of the scorings of 25 *S. alpina* specimens collected as a sample on 21.7.31 follows.

Stem heights. Range from 1.4 to 2.8 dm., with a mean of 2.23 dm.

Anthocyanin in vegetative parts. Much 6 : medium 5 : little 6 : none 1.

Leaf-shape and size. While there is a range in leaf-shape, leaves are all small compared with those in *S. vulgaris*. Well-developed leaves are

narrowly elliptic, elliptic lanceolate-ovate, to elliptic-obovate, and acuminate to shortly acuminate. Sample measurements in cm. are: 1.8 by 0.55 ; 1.0 by 0.45 ; 1.1 by 0.50 ; 1.5 by 0.70.

Indumentum of short and almost bristly hairs. On stems : dense 6 : medium 4 : glabrous or at most with a few hairs 15. On leaves : dense 16 : medium 5 : few hairs 1 : glabrous 3.

No. of flowers per inflorescence : 1/4, 2/8, 3/8, 4/1, 5/2, 6/2. Nearly all plants had some inflorescences with single flowers.

Anthocyanin in calyx. Much 12 : medium 9 : little 2 : none 2.

Calyx shape. Subinflated 21 : narrow 4.

Petal colour. Purple 1 : pink 2 : white 22.

Corona. Boss (or absent) 24 : small scale 1.

Anthocyanin blotch. Present 3 : absent 19.

Petals and segments. Not overlapping 25.

Sex. Hermaphrodite 25.

Anthers and filaments. Purple 24. One plant with yellow-green anthers and white filaments, but this had purple immature seeds.

Stigmata. Purple 23 : white 2.

Immature seeds. Purple 24 (one unscorable).

In addition to the plants included in the above summation of characters, several were collected of which two require special mention.

No. 2395, from glacial debris, had stems 4.2 dm. tall, but broadly elliptic acuminate leaves, 1.7 by 1.1 cm., with dense short indumentum, up to 7-flowered inflorescences, and a small scale. It was probably an exceedingly well developed *S. alpina* variant.

No. 2391, from a stony place amongst brushwood, a little below the top plateau, had stems 6.3 dm. tall, lanceolate-ovate acuminate leaves, 2.3 by 1.1 cm., with dense short indumentum, up to 12-flowered inflorescences, and little anthocyanin in stems and calyces. It was probably a hybrid between *S. alpina* and *S. vulgaris*.

Plants above Ailefroide were in flower and not in fruit or seed.

II. Immediately below the Meije glacier, La Grave side, between 1900 and 2100 m., on granitic glacial scree of a rather dry type, 26.7.31. General vegetation of a very open type.

The plants were mostly of the same prostrate habit and leaf-shape as those above Ailefroide. Most plants had much or medium anthocyanin in the vegetative parts and calyces and most were hairy (only two or three glabrous ones were seen). The inflorescences were mostly 1- to 3-flowered. The flowers were always zygomorphic, though in a few the zygomorphism was not obvious. Zygomorphism is always accompanied by nodding or horizontal extension of the flowers, though when the inflorescences are reduced to one flower the nodding is not extreme. All plants had purple immature seeds, except one with white seeds.

A summation of the scorings of 15 *S. alpina* specimens collected as a sample on 26.7.31 follows.

Stem heights. Range from 1.4 to 4.0 dm. tall, with a mean of 2.64 dm.

Anthocyanin in vegetative parts. Much 4 : medium 9 : little 2.

Indumentum. On stems : dense 2 : medium 3 : glabrous 10. On leaves : dense 8 : medium 2 : few hairs 3 : glabrous 2.

Leaves. Narrowly elliptic to elliptic. Sample measurements in cm. of typical leaves are : 12 by 5, 13 by 7, 28 by 10, 15 by 5.5, 10 by 5, 10 by 5.5.

No. of flowers per inflorescence. 1/2, 2/7, 3/1, 4/1, 6/3, 7/1.

Anthocyanin in calyx. Much 5 : medium 8 : little 1 : none 1.

Calyx shape. Subinflated 9 : narrow 6.

Petal colour. Purple 1 : pink 3 : white 11.

Corona. Boss 13.

Anthocyanin blotch. Present 5 : absent 7.

Petals and segments. Not overlapping 15.

Sex. Hermaphrodite 15.

Anthers, filaments, and stigmata. Purple 15.

Immature seeds. Purple 14 : white 1.

III. Opposite La Grave, on scree of calcareous schists outcropping on the hillside, 1500 m., 25.7.31 and subsequent dates to 3.8.31.

S. alpina here was in both flower and fruit (with abundant seed). The plants were prostrate, with 1- to 3-flowered inflorescences, with purple immature seeds, and the majority were hairy. The flowers were always nodding and zygomorphic, even when the inflorescences were single flowered. White, pink, and purple-red flowered plants occurred. On the petals the corona was scarcely developed or appeared as a boss or (rarely, small scale, no fully developed scales were recorded. 100 plants collected at random had all purple immature seeds. Fruits were all definitely of *S. maritima* type. Of 100 plants collected at random 98 had armadillo (including several with weak armadillo) ripe seeds and 2 had tubercled ripe seeds.

The same general type of *S. alpina* was found on similar calcareous schists at about the same altitude between La Grave and Villar d'Arène in the Vallée de la Romanche on granitic scree, on calcareous schists, and in the dry parts of the river beds. On the calcareous schists in the Vallée some of the typical *S. alpina* plants were of fairly large size and had a moderate number of barren shoots (as in *S. maritima*).

Samples of 11 plants from opposite La Grave and 5 plants from Villar d'Arène were collected and analyzed. The summated results are as follows :—

Stem lengths. Range 1.0 to 3.0 dm., with a mean of 1.6 dm.

Anthocyanin in vegetative parts. Much 7 : medium 8 : little 1.

Indumentum. On stems : glabrous (or at most with few hairs) 14 : medium 2. On leaves : dense 6 : medium 6 : few hairs 2 : glabrous 2.

Leaves. Elliptic, elliptic-obovate, to rounded elliptic, rarely narrowly elliptic. Sample measurements in cm. are : 1.4 by 0.8 ; 1.2 by 0.5 ; 0.6 by 0.3 ; 1.0 by 0.75 ; 1.4 by 0.6 ; 1.5 by 0.9.

No. of flowers per inflorescence. 1/9, 2/7.

Anthocyanin in calyx. Much 11 : medium 5.

Calyx shape. Subinflated 13 : narrow 3.

Petal length. Range from 10 mm. to 15 mm. with mean of 13.27 mm.

Petals often little or not exerted from calyx.

Petal breadth. Range from 3 mm. to 4 mm. with mean of 3.4 mm.

Petal colour. Purple 1 : pink 7 : white 7.

Corona. Boss 13 : small scale 2.

Anthocyanin blotch. Present 3 : absent 6.

Overlapping of petals and segments. All not overlapping.

Sex. Hermaphrodite 15 : female 1.

Filaments, anthers, stigmata, and immature seeds. All purple (a few unscorable).

Intermediates between S. alpina and S. vulgaris.

In the La Grave district plants occur with intermediate or a mixture of characters and were judged to be natural hybrids. Selection, however, is very severe. Thus, opposite La Grave, *S. alpina* (of screes) and *S. vulgaris* (of meadows) meet and intermediates occur. At the junction also, an *S. alpina* plant was found with white seeds, but gene flow is probably very restricted here by the strong selection of well differentiated habitats. On granitic scree near Lac Puy-Vachier, 2380 m. plants intermediate between *S. alpina* and *S. vulgaris* were found (28.7.31). One of these had multilobed petals. Others had bilobed petals with or without an anthocyanin blotch. On the hill slopes, of calcareous schist, opposite Les Fréaux, at about 1450 m., a few plants of *S. alpina* and many of *S. vulgaris* with several intermediates occurred (1.8.31).

Two such plants from the last locality had the following characters :

A. Stems 3.0 dm. Medium anthocyanin in glabrous stems. Leaves narrowly elliptic, 2.5 by 1.0 cm., acute, with dense short indumentum. Flowers per inflorescence 1 to 7, zygomorphic. Calyx subinflated, with medium anthocyanin. Petals and segments not overlapping. Petals bilobed, 3/4-lobing, boss, no blotch. Filaments, anthers, and stigmata purple.

B. Stems 2.3 dm. Medium anthocyanin in stems. Indumentum dense on stems and leaves. Leaves oblanceolate to very narrowly elliptic, 2.0 by 0.7 cm., shortly acuminate. Flowers per inflorescence 3 to 5, zygomorphic. Calyx narrow, with medium anthocyanin. Petals and segments not overlapping. Petals bilobed, 3 4-lobing, boss, blotch present. Filaments, anthers, and stigmata purple. Immature seeds white. Seeds tubercled.

Plants grown from wild seed.

I. Collected on granitic scree of Meije glacier, 26.7.31. Seeds armadillo. 36 plants of which 3 are hybrids judging from the characters.

Stem lengths. Range from 1.8 to 3.9 dm., with mean 2.82 dm. Without the hybrids, 1.8 to 3.4 dm., with mean 2.76 dm. (S.D. 4.37).

Anthocyanin in vegetative parts. Much 3 : medium 31 : little 2.

Indumentum. Dense 5 : medium 19 : few hairs 7 : glabrous 5 (scored for leaves, usually none or less on stems).

Leaves. Mostly elliptic to narrowly elliptic, oblanceolate to subrotund. Length from 13 to 31 mm., mean 22.6 mm. (S.D. 4.8). Breadth from 5 to 15 mm., mean 8.0 mm. Correlation of length to breadth, $r = 0.47$.

No. of flowers per inflorescence. 1/1, 2/28, 3/2, 5/1, 7/1, 15/1. Inflorescences mostly 2-flowered, with one central flower and one lateral branch with two bracts and ending in 1 flower.

Anthocyanin in calyx. Much 3 : medium 22 : little 9.

Calyx shape. Inflated 7 : subinflated 19 : narrow 8.

Petal colour. Red 1 : pink 18 : white 15.

Lobing of petals. Bilobed 33 : multilobed 1.

Depth of lobing. 3/4-lobing 27 : 2/3-lobing 7.

Corona. Small scale 3 : boss 31.

Anthocyanin blotch. Present 16 : absent 18.

Petals and segments. Not overlapping 34.

Anthocyanin in anthers and immature seeds. 34.

Anthocyanin in filaments and stigmata. Purple 33 : white 1.

Sex. Hermaphrodite 34.

Fruit. *S. maritima* type 29 : hybrid type 3.

Seeds. Tubercled 1 : weak armadillo 5 : armadillo 24.

II. La Grave district (opposite La Grave and Sempier), calcareous schists, 1500 m., 25–29.7.31. Seeds armadillo and, a few, weak armadillo. 111 plants. Of these 14 were not true *S. alpina*, but, presumably from their characters, were hybrids between *S. alpina* and *S. vulgaris*. This indicates the amount of natural crossing in the wild in any one season, because selection is so strong that hybrids cannot survive in the typical habitat of *S. alpina* whence the seeds of these plants came.

Stem lengths. Range from 0.9 to 5.5 dm., with a mean of 22.4 dm.

Anthocyanin in vegetative parts. Much 11 : medium 78 : little 18.

Indumentum. Dense 24 : medium 44 : few hairs 10 : glabrous 27.

Leaves. Excluding hybrids : elliptic, obovate, oblanceolate, subrotund linear-oblong, spatulate, acute to subobtusate or shortly acuminate or apiculate. Sample measurements in cm. : 1.3 by 0.5 ; 0.8 by 0.4 ; 0.7 by 0.6 ; 1.0 by 0.5 ; 1.7 by 0.7 ; 2.3 by 1.0 ; 1.0 by 0.3 ; 1.5 by 0.4. Hybrids : oblong, elliptic, oblanceolate, elliptic-lanceolate, acute shortly acuminate. Sample measurements in cm. : 3.7 by 1.3 ; 3.5 by 1.2 ; 3.8 by 1.6 ; 3.2 by 0.9 ; 5.0 by 1.8.

No. of flowers per inflorescence. 1 10, 2 60, 3 17, 4 3, 7/7, 8/1, 9/2, 10/3, 14/1.

Calyx shape. Inflated 31 : subinflated 63 : narrow 11.

Anthocyanin in calyx. Much 20 : medium 57 : little 27 : none 1.

Petal colour. Purple-pink 33 (one very deep) : white 70.

Lobing of petals. Bilobed 102 : multilobed 1.

Depth of lobing. 3/4-lobing 93 : 2/3-lobing 10.

Corona. Small scale 16 : boss 87.

Anthocyanin blotch. Present 30 : absent 63.

Petals and segments. Not overlapping 103.

Anthocyanin in anthers. Purple 77.

Anthocyanin in filaments. Purple 76 : white 1.

Sex. Hermaphrodite 77 : female 26.

Stigmata colour. Purple 100 : white 3.

Immature seeds. Purple 104.

Fruits. *S. maritima* type 79 : hybrid type 4.

Seeds : Tubercled 2 : weak tubercled 2 : weak armadillo 6 : armadillo 75.

III. Near Les Freaux, on mixed scree, about 1450 m., 3.8.31. Seeds mixed tubercled and armadillo. The seeds were from an interesting intermediate population and the "hybrid swarm" nature of this is shown by the summated characters scored for the 34 plants grown.

Length of stems. 3.6 to 9.0 dm., with a mean of 6.38 dm.

Anthocyanin in vegetative parts. Medium 33 : little 1.

Indumentum. Dense 2 : medium 9 : glabrous 23. When present the indumentum was short and of the *S. alpina* type.

Leaves. Elliptic, oblong, or lanceolate, acute to shortly acuminate. Sample measurements in cm. : 4.5 by 1.5 ; 5.0 by 2.2 ; 3.0 by 1.1 ; 5.6 by 1.5 ; 5.7 by 1.8.

No. of flowers per inflorescence. 3/2, 7/4, 8/1, 9/1, 10/1, 11/2, 12/2, 13/3, 15/7, 17/1, 20/3, 21/1, 23/1, 24/3, 28/1, 31/1. The inflorescences very loose with very widely spreading long branches.

Calyx shape. Inflated 12 : subinflated 19 : narrow 3.

Anthocyanin in calyx. Medium 13 : little 21.

Petal colour. Pink 1 : white 33.

Lobing of petals. Bilobed 34.

Depth of lobing. 3/4-lobing 31 : 2/3-lobing 3.

Corona. . Boss 34.

Anthocyanin blotch. Present 1 : absent 33.

Petals and segments. Not overlapping 34.

Anthocyanin in anthers. Purple 20 : yellow-green 1.

Anthocyanin in filaments. Purple 21.

Sex. Hermaphrodite 21 : female 12 : hermaphrodite and female 1.

Stigmata colour. Purple 32 : white 2.

Immature seeds. Purple 12 : white 22.

Fruits. *S. maritima* type 21 : hybrid type 8 : *S. vulgaris* type 1.

Seeds. Tubercled 1 : weak tubercled 4 : weak armadillo 13 : armadillo 12.

S. vulgaris.

I. This, as mentioned above, was common in the St. Nizier district. Two plants are briefly described.

No. 2381. 1300 m., at edge of woodland, 19.7.31.

Stems up to 7.0 dm. tall. Plant glabrous with little anthocyanin. Leaves oblong, shortly acuminate, 5.8 cm. long, 1.6 cm. broad. Flowers per inflorescence up to 20. Calyx subinflated. Petals and segments not overlapping. Anthers, filaments, stigmata, and immature seeds purple. Capsules of *S. vulgaris* type. Seeds tubercled.

No. 2373. 1300 m., at edge of cornfield, 19.7.31.

Stems up to 7.0 dm. tall. Plant glabrous, with no anthocyanin in vegetative parts. Leaves ovate, shortly acuminate, 4.5 cm. long, 2.3 cm. broad. Flowers per inflorescence up to 15. Calyx inflated with little anthocyanin. Petals and segments not overlapping. Anthers, filaments, and stigmata purple. Immature seeds white.

A number of plants which were considered to be natural hybrids between *S. glareosa* and *S. vulgaris* were collected. One is briefly described.

No. 2377. 1300 m., at edge of woodland, at the junction of the main zones of *S. vulgaris* and *S. glareosa*, 19.7.31.

Stems up to 4.7 dm. tall. Plant glabrous, with very little anthocyanin. Leaves narrowly elliptic-oblong, shortly acuminate, 3 cm. long, 1 cm. broad. Flowers per inflorescence 7 to 9. Calyx subinflated. Petals and segments not overlapping. Anthers, filaments, and immature seeds purple. Stigmata white. Capsules of intermediate type. Seeds armadillo.

II. At Le Lautaret, 20.7.31, on rocks projecting from meadows and pastures, at 2100 m., *S. vulgaris* plants, some of which in some characters recall *S. alpina*, occur. In all the surrounding lush meadows more typical *S. vulgaris* plants are abundant.

On 22.7.31, Le Lautaret was again visited and *S. vulgaris* was studied in the meadows and pastures from 2100 to 2500 m. In the lush alpine meadows *S. vulgaris* was abundant and often a co-dominant constituent of the vegetation. More than 100 plants were examined for immature seeds and all had purple seeds. Plants with white, pink, or purple petals occurred but the flowers were always zygomorphic and the petals and lobes did not overlap. The "strict" habit was common. The corona was usually a boss or small scale but the petals in some plants did not even show a trace of a boss. Above 2400 m. the pastures became poor and *Silene* plants ceased to occur in them. Associates of *S. vulgaris* in the meadows and pastures of Le Lautaret included: *Campanula thyrsoidea*, *C. barbata*, *C. rhomboidalis*, *Hedysarum obscurum*, *Cerinthe alpina*, *Anemone alpina*, *Gentiana campestris*, *G. bavarica*, *G. acaulis*, *G. nivalis*, *Arnica montana*, *Centaurea uniflora*, *C. montana*, *Knautia longifolia*, and *Mewia mutellina*.

On 25.7.31, near Le Lautaret, another series of *S. vulgaris* plants in lush meadow was examined at about 2000 m. (i.e. at a slightly lower altitude than those referred to immediately above). The plants were tall; some

were hairy and some glabrous. The stems showed little or no anthocyanin, or some at the base only. All flowers were zygomorphic and the petals and lobes of all did not overlap. The number of flowers per inflorescence ranged from 3 to many. The corona was absent or represented by bosses or small scales. All plants had purple immature seeds.

A summation of the scorings of 22 plants collected in the Le Lautaret district on the above dates, on rocks, screes, and in lush alpine meadows and pastures follows.

Stem lengths. Range from 1.8 to 8.7 dm., with a mean of 4.81 dm. The stems were erect and 7 plants with "strict" habit are included. Some other plants were more or less semi-strict.

Anthocyanin in vegetative parts. Medium 3 : little 9 : none 10.

Indumentum. Where present this was short and usually confined to the leaves or with few hairs on the stems. Dense 2 : medium 6 : few hairs 4 : glabrous 10.

Leaves. Lanceolate, oblong, to narrowly elliptic, acute to slightly acuminate. Sample measurements in cm. are : 4.0 by 1.0 ; 2.3 by 0.5 ; 3.6 by 0.9 ; 5.5 by 1.6 ; 6.0 by 1.8 ; 2.6 by 1.0.

No. of flowers per inflorescence. 3/1, 5/1, 6/2, 7/5, 8/1, 12/1, 13/2, 15/5, 16/1, 18/1, 25/1, 27/1.

Calyx shape. Inflated 4 : subinflated 13 : narrow 5.

Anthocyanin in calyx. Much 5 : medium 7 : little 8 : none 2.

Petal colour. Pink 3 : white 19.

Petal lobing. All bilobed.

Depth of lobing. 3/4-lobing 21 : 2/3-lobing 1.

Petals and lobes. Not overlapping in all.

Corona. Scale 3 : small scale 4 : boss 15.

Anthocyanin blotch. Present 8 : absent 12.

Anthocyanin in anthers. Purple 19 : yellow-green 1.

Anthocyanin in filaments. Purple 19 : white 1.

Sex. Hermaphrodite 20 : female 1.

Stigmata colour. Purple 17 : white 4.

Immature seeds. Purple 17 : white 1.

III. On 25.7.31, 29.7.31, and subsequent dates in early August the meadow and pasture types of *S. vulgaris* were studied around La Grave. The plants at this season were mostly either fruiting or passing into fruit. Capsules of *S. vulgaris* type or intermediate between *S. vulgaris* and *S. alpina* type were usual but some had fruits indistinguishable from *S. alpina* (or *S. maritima*) type, i.e. with broad mouth, completely reflexed teeth and "squat" appearance.

On 29.7.31, opposite La Grave, at between 1450 and 1500 m. the meadow population of *S. vulgaris* was sampled for seeds. Of 50 plants, taken at random, 32 had purple and 18 white immature seeds. Of 100 plants taken at random, 87 had tubercled (including weak tubercled) and 13 armadillo (including weak armadillo) seeds.

On 28.7.31, and subsequent dates the *S. vulgaris* plants in larch woods above La Grave were studied. Plants of a general type indistinguishable from that of the meadows were abundant, even in relatively deep shade.

With reference to populations referred to above it must be noted that in parts of Dauphiné there is a somewhat imperfect distinction between meadows (mown for hay) and pastures (grazed only). Hay-making was in full swing at the end of July in the La Grave district, that is exactly as the vast majority of the *S. vulgaris* plants (abundant in the hay) had ripened their fruits and seeds. The cutting and removal of the hay on the backs of donkeys, mules, and human beings gave every facility for dispersal of matured seeds.

IV. Briançon district. On 23.7.31 between Briançon and Prelles, 1200-1250 m., *S. vulgaris* plants were found scattered in the valley. All those examined had white immature seeds. Stem height ranged from 3.8 to 4.4 dm. Anthocyanin in vegetative parts was medium or none and in calyces medium or little. Numbers of flowers per inflorescence ranged from 8 to 16. Calyces were subinflated, petals white, with boss, no blotch; petals and segments not overlapping. Anthers and filaments (when present) and stigmata purple.

The *S. vulgaris* populations in woods of *Pinus sylvestris* and on rocks at margins of pine woods were examined above Briançon, 1350 to 2000 m., on magnesian limestone, on 24.7.31.

All the *Silene* plants seen were referred to *S. vulgaris*, though they showed much variation. They occurred in the pinewood scattered under the trees in dense shade, associated with species of *Pyrola*, *Ononis*, etc. They were also found in open grassland patches and on rocks, as well as along path-sides. In habit, the plants were erect or ascending. There was considerable range in leaf shape. Glabrous and hairy plants occurred, as well as those with pink or white flowers. All plants had zygomorphic flowers with petals and segments not overlapping. The petals were bilobed. The corona was generally represented by mere bosses or, occasionally, very small scales. Fruiting and seeding were good. Most plants had white immature seeds but purple-seeded plants occurred.

A sample of 10 plants collected near Le Croix de Toulouse, above Briançon on rocks and scree and in pinewoods, on dolomitic (magnesian) limestone, 1970 m., was scored as follows.

Stem lengths. Range 2.4 to 5.8 dm., with mean of 3.64 dm. Stems erect. One plant of "strict" habit.

Anthocyanin in vegetative parts. Much 1 : medium 2 : little 6 : none 1.

Indumentum. Dense 2 : medium 1 : few hairs 1 : glabrous 6.

Leaves. Lanceolate, oblong, to narrowly elliptic, acute to slightly acuminate. Sample measurements in cm. are : 7.5 by 2.5 ; 4.0 by 1.0 ; 2.0 by 0.9.

No. of flowers per inflorescence. 4/2, 5/1, 7/2, 8/1, 9/1, 10/1, 11/1, 17/1.

Calyx shape. Subinflated 9 : narrow 1.

Anthocyanin in calyx. Medium 3 : little 6 : none 3.

Petal colour. Purple 1 : pink 2 : white 7.

Lobing of petals. All bilobed.

Depth of lobing. 3/4-lobing 8 : 2/3-lobing 2.

Corona. Boss 9.

Anthocyanin blotch. Absent 8.

Petals and segments. Not overlapping 9.

Anthocyanin in anthers and filaments. 3.

Sex. Hermaphrodite 3 : female 6.

Stigmata colour. Purple 8 : white 2.

Immature seeds. Purple 1 : white 9.

Plants grown from wild seed.

I. Collected in high mountain pasture, above Le Lautaret, 2200 m., 23.7.31. 60 plants (52 scored for indumentum, measurements, fruits and seeds). One plant had abnormal flowers.

Stem lengths. Range from 3.9 to 9.2 dm., with mean 6.6 dm. (S.D. 12.8). Three plants had stems prostrate, at least at base.

Anthocyanin in vegetative parts. Much 5 : medium 50 : little 5.

Indumentum. Stems : dense 4 : medium 5 : glabrous 43 ; leaves dense 4 : medium 25 : few hairs 5 : glabrous 18.

Leaves. Lanceolate to narrowly lanceolate or narrowly elliptic, acute to shortly acuminate. Sample measurements in cm. are : 5.0 by 2.3 ; 6.5 by 1.9 ; 10.0 by 2.3 ; 7.5 by 2.2 ; 7.8 by 1.9. One plant had strict habit.

No. of flowers per inflorescence. Range from 5 to 42, with mean 18.98 (S.D. 8.72).

Anthocyanin in calyx. Medium 1 : little 41 : none 17.

Calyx shape. Inflated 26 : subinflated 26 : narrow 7.

Petal length. Range from 14 to 23 mm., with mean 18.94 mm. (S.D. 1.70).

Petal breadth. Range from 4 to 9 mm., with mean 6.2 mm. (S.D. 1.22).

Petal colour. With purple colour (more or less) 16 : white 43.

Lobing of petals. Bilobed 58 : multilobed 1.

Depth of lobing. 3/4-lobing 46 : 2/3-lobing 13.

Corona. Small scale 5 : boss 54.

Anthocyanin blotch. Present 17 : absent 42.

Overlapping. Petals and segments not overlapping 59.

Anthers and filaments. Purple 52.

Sex. Hermaphrodite 51 : hermaphrodite and female 1 : female 7.

Stigmata colour. Purple 42 : white 17.

Immature seeds. Purple 54 : white 3.

Fruits. *S. maritima* type 35 : hybrid type 12 : *S. vulgaris* type 2. Capsules have been scored thus on reflexing of teeth and width of mouth. The shape varies and in some scored as *S. maritima* type it is elongated and with

the gradual slope (not strongly marked shoulders) characteristic of British *S. vulgaris*.

Mature seeds. Tubercled 1 : weakly tubercled 12 : weak armadillo 35 : armadillo 1.

II. High mountain meadows near La Grave, 25-27.7.31. 56 plants.

Stem lengths. Range from 4.7 to 9.5 dm., with mean of 7.2 dm.

Anthocyanin in vegetative parts. Much 3 : medium 26 : little 27.

Indumentum. Leaves medium 5 : few hairs 4 : glabrous 47 ; stems medium 4 : few hairs 4 : glabrous 48.

Leaves. Narrowly oblong to lanceolate, acute to acuminate. Sample measurements in cm. are : 5.2 by 0.8 ; 6.0 by 2.3 ; 8.5 by 1.5 ; 4.5 by 1.1 ; 7.5 by 1.9.

No. of flowers per inflorescence. Range from 7 to 46, with mean of 21.9.

Anthocyanin in calyx. Medium 6 : little 45 : none 4.

Calyx shape. Inflated 30 : subinflated 24 : narrow 1.

Petal colour. Purple 1 : white 54.

Lobing of petals. Bilobed 55.

Depth of lobing. 3/4-lobing 46 : 2/3-lobing 9.

Corona. Small scale 9 : boss 46.

Anthocyanin blotch. Present 5 : absent 50.

Overlapping. Petals and segments not overlapping 54 : petals overlapping, segments not overlapping 1.

Anthers and filaments. Purple 21.

Sex. Hermaphrodite 20 : hermaphrodite and female 1 : female 34.

Stigmata colour. Purple 43 : white 12.

Immature seeds. Purple 47 : white 8.

Fruits. *S. maritima* type 12 : hybrid type 35 : *S. vulgaris* type 5.

Mature seeds. Tubercled 12 : weakly tubercled 24 : weak armadillo 13 : armadillo 3.

III. Dry calcareous schistose hill slopes, near La Grave, 25.7.31. 28 plants.

Stem lengths. Range from 5.1 to 8.8 dm., with mean of 7.1 dm.

Anthocyanin in vegetative parts. Much 2 : medium 18 : little 8.

Indumentum. Stems and leaves : medium 2 : few hairs 3 : glabrous 23.

Leaves. Narrowly oblong, narrowly lanceolate, to lanceolate, acute to shortly acuminate. Sample measurements in cm. are : 5.6 by 1.0 ; 7.3 by 1.7 ; 7.0 by 2.6 ; 5.5 by 1.2.

No. of flowers per inflorescence. Range from 12 to 49, with mean of 24.5.

Anthocyanin in calyx. Medium 10 : little 15 : none 2.

Calyx shape. Inflated 21 : subinflated 4 : narrow 2.

Petal colour. Purple 1 : white 26.

Lobing of petals. Bilobed 27.

Depth of lobing. 3/4-lobing 27.

Corona. Small scale 3 : boss 24.

Anthocyanin blotch. Present 1 : absent 26.

Overlapping. Petals and segments not overlapping 27.

Anthocyanin in anthers. Purple 6.

Anthocyanin in filaments. Purple 5 : white 1.

Sex. Hermaphrodite 6 : female 21.

Stigmata colour. Purple 23 : white 4.

Immature seeds. Purple 12 : white 14.

Fruits. *S. maritima* type 12 ; hybrid type 11 : *S. vulgaris* type 2.

Mature seeds. Tubercled 5 : weakly tubercled 15 : weak armadillo 4 : armadillo 1.

Abnormal flowers. Three plants grown from seed collected in the La Grave district produced vegetative shoots or structures intermediate between shoots and flowers in place of normal flowers. These abnormalities have not always the same details of structure. Most often the calyx and corolla are represented by separate small green leaves ; petaloid organs are absent but there are usually a number of organs more or less intermediate between leaves and stamens in the position of the stamens. The gynoecium, as such, is absent but there is a vegetative or vegetative and inflorescence bud in the centre of the " abnormal flower".

IV. Above Briançon, on Magnesian Limestone, in or at the margins of pinewoods, 24.7.31. 33 plants.

Stem lengths. Range from 2.5 to 7.3 dm., with mean of 5.2.

Anthocyanin in vegetative parts. Much 10 : medium 8 : little 14 : none 1.

Indumentum. On stems and leaves : medium 2 : glabrous 31.

Leaves. Lanceolate, linear-lanceolate, to linear-oblong. Sample measurements in cm. are : 5.0 by 0.8 ; 3.9 by 0.8 ; 2.6 by 0.6 ; 4.0 by 1.0 ; 5.5 by 1.4 ; 8.8 by 1.4.

No. of flowers per inflorescence. Range from 5 to 55, with mean of 14.0.

Anthocyanin in calyx. Much 1 : medium 19 : little 13.

Calyx shape. Inflated 5 : subinflated 14 : narrow 11.

Petal colour. White 31.

Lobing of petals. Bilobed 31.

Depth of lobing. 3/4-lobing 17 : 2/3-lobing 14.

Corona. Boss 31.

Anthocyanin blotch. Present 1 : absent 30.

Overlapping. Petals and segments not overlapping 31.

Anthers and filaments. Purple 9.

Sex. Hermaphrodite 9 : female 22.

Stigmata colour. Purple 20 : white 11.

Immature seeds. Purple 6 : white 22.

Fruits. *S. vulgaris* type 18 : hybrid type 3.

Mature seeds. Tubercled 8 : weakly tubercled 3 : weak armadillo 6 : armadillo 1.

Discussion

All the populations of bladder campions examined in the French Alps appeared exceptionally well-grown and free from disease. *Ustilago* occurred sporadically in all large populations, but never abundantly. *Marssonina* was not observed in the field though a few individuals developed the disease when grown from seed at Kew, but not badly and only in *S. vulgaris* plants.

Habitats. Altitudes at which studies of wild populations were made ranged from 1200 to 2500 m. Soils were mainly of immature kinds derived from granite, calcareous schists, or magnesian (dolomitic) limestone. A favourite habitat for *S. glareosa* and *S. alpina* was loose scree on, often steep, slopes. Indeed, loose substratum seemed sometimes to be even more important than absence of competition. Thus, opposite La Grave, *S. alpina* occurred on the loose calcareous schistose scree but not on the solid calcareous schistose rock. The meadow type of *S. vulgaris*, growing a few metres lower down, grew abundantly in closed mixed communities, but obviously flourished best where the substratum was loose, as on lush meadow or pasture covering old avalanches or old scree, and also on artificial road or path embankments. This preference for a loose substratum may be connected either with root penetration or with seedling establishment or with both. Attention may be called to the different behaviour of root-systems of *S. vulgaris* and *S. maritima* on different soils in the transplant experiments at Potterne, as recorded by the present authors (Journ. Ecol. **21**, 278 : 1933 ; l.c. **23**, 450 : 1935 ; l.c. **33**, 65 : 1945). There is the closest connection between habitats and habit, especially in regard to the kind and degree of competition with other plants as shown by the limitation of taxonomic units (taxa) to screes, meadows, woods, etc.

Habit. This ranges from low-growing or even prostrate plants of *S. alpina* to erect examples of *S. vulgaris* nearly 1 m. tall. There is a high correlation between taller growth and larger leaves and more numerous flowers per inflorescence. In no population in the wild were definite "barren shoots" or indications of a chamaephytic habit observed. In only one plant of *S. alpina* (from Sempier) grown at Kew were there overwintering green shoots. Thus, with this one exception among hundreds of plants—at least 500 *S. alpina* plants were examined *in situ*—the overwintering habit in *S. vulgaris*, *S. glareosa*, and *S. alpina* in the French Alps was hemicyptophytic not chamaephytic. This is a character of *S. vulgaris* as opposed to *S. maritima*. It is interesting to note that the "strict" habit, with the leaves placed parallel to the parent stem, was found in high mountain *S. vulgaris* populations, as in British material from chalk downlands and other habitats.

Since the main habit characters are of taxonomic value it is interesting that they are closely connected with habitat conditions and are subject to strong and direct natural selection. This is well seen, for example, opposite La Grave, where the calcareous schistose scree with a population of *S. alpina* is juxtaposed to but sharply demarcated from meadows, reserved for mowing, with an abundant (co-dominant) population of *S. vulgaris*. Neither species occurs in the habitat of the other and only a few intermediate plants (hybrids) were found at or near the line of junction.

S. alpina, with its low habit of growth, would be completely smothered by the tall dense lush growth of the meadow herbage. Tall, erect-growing, *S. vulgaris* would be broken by winds, or over-whelmed by descending scree, on the schistose slopes.

Indumentum. Hairy and glabrous plants occurred in populations of *S. alpina* and *S. vulgaris*. Indumentum was sometimes dense, sometimes medium, and sometimes of few hairs. Often the scoring for indumentum was the same for leaves and stems but there was some tendency for indumentum to be less on stems than on leaves. The hairs of the high mountain bladder campions are shorter, more bristly in appearance, than the hairs in varieties of *S. vulgaris* in Britain. They consist of 3 to 5 cells that are progressively narrower upwards and are about one-third of a mm. long. In British *S. vulgaris* with indumentum the hairs have up to 8 cells, markedly taper upwards, and are up to 1 mm. in length. It is noteworthy that *S. maritima* has never been found with hairs (apart from cilia on leaf margins). Since glabrous plants are common in high mountain populations (sometimes commoner than hairy ones, it cannot be suggested that indumentum has any selective value. *S. glareosa* in the wild was always glabrous. Amongst plants grown from wild seeds the vast majority were glabrous, but 2.6 per cent. were hairy. This probably represents infiltration of genes from neighbouring populations of *S. vulgaris*.

Anthocyanin development. In general, this is greater in high mountain bladder campions than in inland lowland populations. This is particularly notable in petal colour and in the colour of immature seed coats. No plants were recorded without anthocyanin in every organ. It is possible that anthocyanin has some value in protecting protoplasm from the insolation of a high mountain climate.

Number of flowers per inflorescence. In *S. glareosa* there are generally 3 to 7 flowers in an inflorescence and in *S. alpina* 1 to 3. High numbers, up to 55, occur in *S. vulgaris* from the French Alps. The exact number of flowers varies not only with genetic constitution but with habitat conditions. There is a general tendency to an increase under cultivation. It is interesting to note that in several high mountain populations of *S. vulgaris*, notably at Le Lautaret, there is a very considerable range in number of flowers, with good dispersal between the extremes. The low-growth of *S. alpina* is correlated with the few-flowered inflorescences in agreement with habitat conditions. It is most probable that both *S. alpina* and *S. glareosa* have been derived from ancestors with normally many-flowered inflorescences by mutations resulting in slowing the rate of growth. There are genetical as well as environmental factors limiting the amount of cymose branching.

Leaves. The bladder campions in the French Alps, taken as a whole, show a much greater diversity of leaf sizes and shapes than in any other area of comparable extent where we have studied them or whence we have received or grown large collections. *S. glareosa* has generally narrow leaves, narrowly or linearly lanceolate; *S. alpina* has small leaves which are sometimes almost round in shape; *S. vulgaris* ranges in size and shape more widely than in British populations, from leaves as narrow as the average in *S. glareosa* to broadly lanceolate or even ovate, but not with leaves as small as those of *S. alpina*.

Calyx shape. Inflated, subinflated, and narrow calyces occurred in different proportions in different populations but subinflated was by far the commonest shape. No examples of long cylindric calyces, such as have been found rarely in British populations of *S. maritima* (see K.B. 1939 : 298-304) were seen. The extremely inflated type of calyx recorded K.B. 1948 : 33-42 for plants from the Pyrenees was also not found.

Flowers. In all populations of *S. glareosa*, *S. alpina*, and *S. vulgaris* in the wild and in all plants grown from collected seed the flowers were nodding and zygomorphic. Particular attention was paid to this character in the 1- to 3-flowered plants of *S. alpina*, as it was thought that erect actinomorphic flowers similar to those of *S. maritima* might occur. None was found.

Petals. Nearly all petals were bilobed. The multilobed condition was very rare indeed. In *S. glareosa* there was, in plants grown from collected seed, the greatest range in depth of lobing that we have ever recorded in bladder champions—from 3/4-lobing to entire. From this material we have been able, for the first time, properly to study the genetics of petal lobing in *Silene*. The corona was most often represented by bosses but these were frequently exceedingly small and hardly detectable with a hand-lens. Small scales occurred in a minority of plants and scales very rarely indeed and not at all in *S. alpina*. Petals and segments did not overlap (one exception only in one plant of *S. vulgaris* with petals slightly overlapping).

Sex. Plants with hermaphrodite or female flowers occurred but plants with both were rare. In the wild, female plants were rare in *S. alpina*.

Fruits. These were most interesting because in *S. alpina* and *S. glareosa* they were nearly all of “*S. maritima* type”, that is the capsules are short relative to their breadth, have well marked “shoulders”, wide mouths, and strongly reflexed teeth. Occasionally these characters were not all fully developed and the capsules were then scored as “intermediate” (unless otherwise stated). *S. vulgaris* populations varied more in fruit characters. In all of those studied, some plants had “*S. vulgaris* type” capsules, that is with more elongated less “squat” shape, gradual slopes not “shoulders”, narrow mouths, and erect teeth. However, even in *S. vulgaris* populations “*S. maritima* type” and/or “intermediate” capsules were recorded, especially from the Le Lautaret and La Grave districts. This character of parallelism with *S. maritima* is discussed below.

Mature seeds. Tubercled, weakly tubercled, weak armadillo, and armadillo seeds are all recorded. Fully tubercled seeds are much rarer and armadillo seeds are much commoner than in *S. vulgaris* populations studied in the British Isles. Again, there has to be suggested a parallelism with *S. maritima*.

Order of fruiting. In the wild, meadow, pasture, and woodland populations of *S. vulgaris* are the earliest to ripen fruits and set seeds. *S. glareosa* is next and *S. alpina* last.

Conclusions.

The bladder champions of the French Alps are remarkable for the great range of characters, for the close correlation of some of these characters to definite habitat conditions, and for the parallelism of some characters to those of *S. maritima*.

The following are suggestions regarding the history of the bladder champions in Europe. An ancestral form occurred in the late Tertiary, largely as a woodland, wood margin, and brushwood herb over most of northern, central, and, probably, southern Europe. The on-coming of the Ice Age drove all plants of tall habit (that is, of more or less the modern *S. vulgaris* habit) southwards, or at least exterminated them in the north. However, some plants survived the Ice Age in the British Isles, northern France, and Scandinavia by retaining through selection or developing by mutation a low chamaephytic habit with 1- to 3-flowered inflorescences, together with other characters, apparently in part of a non-selective type, and by mutation obtaining erect actinomorphic flowers, with often broad overlapping petals and segments, became *S. maritima* as we know it. The diagnostic characters of *S. maritima*, as contrasted with those of typical *S. vulgaris*, were retained by isolation due primarily to the Ice Age conditions and afterwards to ecological isolation.

In north-western France, *S. maritima*, by mutation, developed *S. thorei*. *S. vulgaris*, by mutation, and ecotypic selection developed *S. glareosa* and *S. alpina* in Central Europe, and various other taxonomic and ecological groupings in southern Europe which are not under consideration here. Character parallelisms between *S. alpina* and *S. glareosa* on the one hand and *S. maritima* on the other, developed as independent mutations or were independently selected from a common ancestral stock. There is no evidence that the characters of either were directly derived from those of the other.

So far as the British Isles and, probably, northern Europe generally are concerned, *S. maritima* and *S. vulgaris* occur as populations well and easily diagnosed systematically and ecologically. The differentiating characters are more numerous and more clear-cut than those between *S. alpina*, *S. glareosa*, and *S. vulgaris* in the French Alps. There is clear support from systematic and distributional data for the view that, so far as the ancestors of existing populations are concerned, *S. maritima* survived the Ice Age in the British Isles but that *S. vulgaris* did not. The latter was introduced (or re-introduced) into Britain in post-glacial times. Most probably it has been brought here many times by man in the form of weed seeds with crop seeds, chicken-food, etc.

The results of extensive breeding experiments, in which plants from the French Alps were used, are to be dealt with later in this series and amongst other problems then to be considered is that of sterility between different stocks.

Summary.

In this paper the results are given of a study of bladder champions *in situ* in the French Alps and of growing series of plants at Kew from wild-collected seed. It is shown that *S. vulgaris*, *S. glareosa*, and *S. alpina* occur in populations the habits of whose constituent plants is closely correlated

with habitat conditions. 673 plants have been analyzed for characters considered in this series. Some characters are recorded that do not occur in populations of bladder campions in northern Europe. Other characters parallel those found in *S. maritima*. It is suggested that mutation and selection connected with the Ice Age and its on-coming led to the isolation of *S. maritima* in northern Europe and to the differentiation of other groupings in the Alps.

Pathogenic Fungi* :—This is not, as one might suppose from the title, still another textbook of plant pathology, but a collection of essays on medical mycology ; “ pathogenic ” in this instance signifies “ pathogenic to man ”. Chapters have been contributed by 12 eminent students of medical mycology, summarising recent advances in their respective fields.

The editor has dealt with the metabolic products, respiration and fermentation of pathogenic fungi and, in collaboration with J. W. Williams, with their nutrition and metabolism. Dr. J. Lodder and A. de Minjer discuss the biology of the pathogenic *Torulopsidoideae*, Dr. A. L. Carrion and M. Silva deal with *Chromoblastomycosis* and its etiologic fungi, Dr. R. W. Benham with the biology of *Pityrosporum ovale* and Dr. C. W. Emmons with the biology of coccidiosis. Dr. F. W. Wolf summarises facts and theories concerning the action of sulphonamides and antibiotic agents on pathogenic fungi and Dr. R. H. Peck sets out the little that is known about Lipids and Fungi. The meagre information about geographic distribution of systematic fungus diseases of Man is illustrated on seven maps by Dr. D. P. Martin. R. Ciferri and P. Redaelli have contributed a very brief review of the publications of Italian mycopathologists during the war years, 1941-1945. This forms chapter 6 of the work, but amounts to little more than an annotated list of references, which seems out of place in the middle of a series of well-balanced critical essays, each surveying one well-defined field of activity.

Though the title stresses the biological activities of the organisms, their taxonomy is not neglected. Indeed the taxonomic mycologist is encouraged at the outset by the editor's comments (p. 6) that “ a sound taxonomy is practically an essential basis for any comparative endeavour on a group of organisms ”. Unfortunately a vast increase in the number of workers will be required before mycological taxonomy can have a tolerably sound foundation. Few, even of mycologists, realise how little is known and on what slender and unsound bases many of the genera they familiarly use are founded. Thus in chapter 3 we find Carrion and Silva still referring species to the genus *Hormodendron* which Nannfeldt ⁽¹⁾ has clearly shown to be a “ genus omnino dubium ”. As interpreted by modern authors it is a synonym of *Cladosporium* Link.

* *Biology of Pathogenic Fungi*. Edited by Walter Nickerson, Waltham, Mass.; Chronica Botanica Co., London, W.C.2; Wm. Dawson & Sons, Ltd. Price \$5.

¹ Melin E. and Nannfeldt J. A. Svenska Skogsvårdsföreningen Tidskr. 3, (4), 426 (1934).

On the whole the editing seems to have been admirably done and there is little indication of overlapping or mutual contradiction by the contributors to this volume. One minor point which seems to have been overlooked is that the combination *Phialophora pedrosoi* is ascribed to Binford et al. 1944 on page 29 and to Redaelli and Ciferi 1942 on p. 84.

Valuable as this book is to the mycologist, especially to the student of yeasts and moulds, it contains much information of interest to a wider public. It is well to be reminded that human pathogens seem to have arisen in almost all the great groups of fungi. *Coccidioides* is regarded as a Phycomycete, *Madurella* as a Basidiomycete, *Pityrosporum*, *Candida albicans* and the Torulopsidoideae are yeasts, while most of the remaining species are Actinomycetes or Hyphomycetes, presumably with ascomycetous affinities. Geneticists will be interested to hear of an apparent mutant with a gain in synthetic ability. Normal isolates of *Trichophyton mentagrophytes* are unable to utilise NH_4NO_3 whereas the mutant could use this as its sole source of Nitrogen. From the evolutionary standpoint it is interesting, too, to learn that some of the most virulent pathogens are not highly specialised metabolically, but can live as saprophytes and probably do so in nature. Students of animal ecology and population fluctuations will find suggestive Emmon's discovery that certain desert rodents in Arizona apparently act as a reservoir of Coccidiomycosis and presumably succumb to infection in nature. It is interesting to find that a melanin is produced in spores of *Sporotrichum schenckii* for melanins are widespread in the animal kingdom, phanerogams and agarics but seem little known in moulds. The black colour of *Aspergillus niger* spores is due to quite a different substance, apparently akin to haemoglobin. The pigment production by species of *Trichophyton* suggests analogies with that by the morphologically somewhat similar species of *Helminthosporium* studied by Raistrick and his school.

This is a book on which editor and publisher alike are to be congratulated and which should find a place in the libraries of medical schools and botanical departments. By modern standards the price is not excessive.

R. W. G. DENNIS.

Ventilago madraspatana Gaertn., var. **fructifida** Santapau, var. nov. Multis in partibus accedit ad varietatem typicam *Ventilaginis madraspatanae* Gaertn., a qua tamen differt ala fructuum plus minusve profunde bifida in apice. Flores et fructus paniculati, paniculis terminalibus, sat magnis. Ala fructifera bifida in apice, incisae ad 10 mm.; duplex alae apex divergens, rotundus, subrotundus vel subacutus, saepe apicis partes distincte inaequales longitudine. Caetera ut in typo. Huius varietatis typus lectus est a cl. L. D. Garade in loco Khandala, die 22 martii, anni 1905, et servatur in herbario Coll. Sci. Poona (Typus *Garade* 1! Paracet iso-typi *Garade* 2, 3, 41). The wing of the fruit of the new variety is not only bifid, but also the two parts of the apex of the wing often are distinctly unequal in length: all the fruits show the same peculiarity.

H. SANTAPAU.

NOTES ON AFRICAN GRASSES: XXIII.*

C. E. HUBBARD.

FESTUCEAE

Pseudobromus brassii C. E. Hubbard, sp. nov. ; a *P. bifloro* A. Camus, culmis altioribus nodos versus retrorse scaberulis, foliorum vaginis apicem versus retrorse scaberulis vel minute hispidulis, lamina longioribus et latioribus, ligulis longioribus, pedicellis spiculis glumis et lemmatibus brevioribus, arista subterminali differt.

Gramen perenne, laxe caespitosum, 150–180 cm. altum ; innovationes extravaginales. *Culmi* erecti, 2–3-fasciculati, validiusculi, teretes, usque 4 mm. diametro, simplices, circiter 10-nodos, nodos atro-brunneos versus minute et retrorse scaberuli, ceterum glabri, laeves, internodio supremo laevi e vagina longe exserto. *Folia* atro-viridia ; vaginac teretes, striatae, apicem versus retrorse scaberulae vel minute hispidulae, ceterum glabrae et laeves, marginibus liberae, apice exauriculatae, basales et intermediae internodiis longiores, superiores internodiis breviores ; ligulae obtusissimae vel truncatae, firme membranaceae vel chartaceae, usque 5 mm. longae ; laminae lineares, basin versus attenuatae vel basi contractae, apice longe attenuatae, tenuissime acutae, usque 45 cm. longae et 1.6 cm. latae, planae, firmae, tenuiter et arcte multinerves, inter nervos transverse nervatae, nervis prope margines et apicem versus minute scaberulae, marginibus scabridae, ceterum glabrae, laeves. *Panicula* laxissima, nutans, plus minusve oblonga, 35 cm. longa, 15 cm. lata ; rhachis laevis ; rami erecti vel demum patentes, bini, elongati, inferiores usque 25 cm. longi, gracillimi, glabri, laxissime et distante divisi ; ramuli scabridi ; pedicelli fere capillares, inaequales, 4–18 mm. longi, scabridi. *Spiculae* 8–9 mm. longae, 2-florae, oblongae, demum obcuneatae, virides vel purpureo-tinctae ; rhachilla dorso dense scabrida, filiformis, internodiis 2 mm. longis. *Glumae* paullo inaequales, marginibus latis hyalinis exceptis herbaceo-membranaceae, 1–3-nerves, nervis lateralibus brevibus ; inferior lanceolata, acuminata, tenuiter acuta, 4.5–5 mm. longa ; superior late lanceolata vel ovata, acuta, nonnunquam mucronata, 5.5–6.5 mm. longa. *Anthoecia* 3, duo ♂, supremum sterile. *Lemnata* a latere visa lineari-lanceolata, explanata oblongo-ovata vel elliptico-ovata, acuta, 7–8 mm. longa, marginibus angustis et apice hyalinis exceptis firme herbacea, 3-sub5-nervia, nervis intermediis valde obscuris, minutissime et dense asperula, aristata ; arista 10–14 mm. longa, subterminalis, stricta vel flexuosa, minute scaberula. *Paleae* anguste oblongae, acutae, lemmatibus paullo breviores vel aequilongae, carinis minute scaberulae. *Lodiculae* oblongae, inaequaliter lobatae, 1.5 mm. longae. *Antherae* 4 mm. longae. *Ovarium* apice minute et sparse pubescens.

NYASALAND : North Nyasa District ; Nyika Plateau, common in small openings in montane forest, 2350 m., August 7, 1946, *Brass* 17282.

The genus *Pseudobromus* K. Schum., as at present understood, comprises six to eight species of forest grasses occurring in East Africa (Didinga and Imatong Mountains, Anglo-Egyptian Sudan,

* Continued from K.B. 1939, 643.

southwards to the Transvaal) and Madagascar. As originally described it was characterised by lanceolate 1-flowered spikelets and 3-nerved lemmas. In the new species and in *P. biflorus* A. Camus, however, —the latter known from the description alone—the spikelets possess two fertile and a third sterile floret, whilst the lemmas are 3–5-nerved, the inner pair of nerves in 5-nerved lemmas being very obscure and imperfectly developed. In these respects the two species closely approach the genus *Festuca* L., in which the spikelets bear two or more fertile florets and the lemmas are 5–7-nerved. Judging from the description of *P. biflorus* A. Camus, this species differs from *P. brassii* by its shorter (0.75 m.) smooth culms, smooth leaf-sheaths, shorter (20–28 cm.) and narrower (5–7 mm.) leaf-blades, shorter (1.5–2 mm.) ligules, longer (0.5–5 cm.) pedicels, and by its longer glumes (I. 5–5 mm., II. 7–7.5 mm.) and lemmas (9–10 mm.).

AGROSTEA

Agrostis greenwayi C. E. Hubbard, sp. nov. ; ab *A. whytei* C. E. Hubbard, panicula laxiore, ramis binis, spiculis paullo majoribus, rhachilla haud producta, lemmatis nervis breviter hispidulis, arista prope basin lemmatis orta, antheris longioribus differt.

Gramen perenne, caespitosum, usque 65 cm. altum. *Culmi* erecti vel basi leviter geniculati, graciles, teretes, usque 2.5 mm. diametro, simplices, 2-nodes, glabri, laeves. *Foliorum vaginae* solutae, internodiis longiores, striatae, scaberulae, glabrae ; *ligulae* oblongae, demum laceratae, usque 5 mm. longae ; *laminae* lineares, tenuiter acutae, usque 16 cm. longae et 5 mm. latae, planae, firmae, virides, glabrae, prominenter nervatae, nervis scabridae. *Panicula* laxa, plus minusve contracta, erecta vel leviter nutans, 25–28 cm. longa, usque 4 cm. lata ; *rhachis* gracillima, inferne laevis, superne scaberula, internodiis inferioribus usque 7 cm. longis ; *rami* erecti vel adscendentes, distantes, bini, tenuiter filiformes, stricti, inferne laeves, superne scabridi, inferiores usque 15 cm. longi, basin versus per 7 cm. nudati et simplices, superne divisi, ramulis plus minusve appressis ; *pedicelli* scaberuli, laterales inaequales, 1–5 mm. longi. *Spiculae* lineari-oblongae, demum hiantes, 5.3–5.5 mm. longae, pallide virides vel purpureo-tinctae ; *rhachilla* haud producta. *Glumae* a latere visae anguste lanceolatae, tenuiter acutae, firme membranaceae, 1-nerves, carina scabridae, lateribus leviter et minute scaberulae, subaequales vel plerumque paullo inaequales, inferior superiore longior. *Lemma* explanatum ovato-oblongum, truncato-emarginatum, 2.7–3 mm. longum, tenuiter membranaceum, 5-nerve, nervis lateralibus breviter excurrentibus, nervis appresse et breviter hispidulum ; callus minutissime et obscure barbatus ; *arista* prope basin lemmatis orta, leviter geniculata, circiter 4 mm. longa. *Palea* late oblonga, truncata, 0.8 mm. longa, hyalina, tenuissime 2-nervis, glabra. *Antherae* 1.5–2 mm. longae. *Caryopsis* anguste oblonga, 1.8 mm. longa.

NYASALAND : Mt. Mlanje ; Lichenya Plateau, 1890 m., rare, with *Moraea*, *Xyris*, *Lycopodium carolinianum*, *Sphagnum*, in wet places in Rendlia—*Helichrys* grassland, on a stony peaty soil overlying rock ; a perennial tussock grass up to 2 ft. tall ; October 16, 1941, *Greenway* 6307.

Four species of *Agrostis* are now known from the mountains of Nyasaland ; three of them, *A. whytei* C. E. Hubbard, *A. huttoniae* (Hack.)

C. E. Hubbard, and the above new species are from the southern part of the Protectorate, whilst the precise locality of the fourth, *A. continuata* Stapf, is not recorded, although it may have come from the south, since the species has a southerly distribution, occurring also in Southern Rhodesia. The Nyasaland species may be distinguished by the characters given in the following key.

Callus of the floret minutely hairy or very shortly bearded with hairs up to one-third the length of the lemma :

Lemma awned from the middle of the back ; palea up to half the length of the lemma ; callus-hairs up to 1 mm. long ; spikelets 4 mm. long ; panicle contracted and moderately dense ... 1. *A. whytei*.

Lemma awned from just above the base ; palea one-fourth to one-third the length of the lemma ; callus minutely and obscurely hairy :

Panicle more or less spiciform, 1.2–2 cm. wide, with densely spiculate branches ; spikelets 4–5 mm. long ; glumes linear-lanceolate 2. *A. continuata*.

Panicle rather loose, yet contracted, 2–4 cm. or more wide, with closely spiculate branches ; spikelets 5.3–5.5 mm. long ; glumes narrowly lanceolate 3. *A. greenwayi*.

Callus bearded with hairs as long or almost as long as the lemma ; spikelets 2.6–3 mm. long ; palea slightly shorter than the lemma ; panicle contracted but rather lax 4. *A. huttoniae*.

1. ***A. whytei*** C. E. Hubbard in Kew Bull. 1936 : 302 (1936) et in Hill, Fl. Trop. Afr. 10 : 179 (1937).

Distr. Nyasaland : Zomba Plateau.

2. ***A. continuata*** Stapf in Kew Bull. 1897 : 290 (1897) ; C. E. Hubbard in Hill, Fl. Trop. Afr. 10 : 180 (1937).

Distr. Nyasaland and Southern Rhodesia.

3. ***A. greenwayi*** C. E. Hubbard, vide supra.

4. ***A. huttoniae*** Hack., C. E. Hubbard in Hill, Fl. Trop. Afr. 10 : 172 (1937), in clavi ; Goossens et Papendorf in S. Afr. Journ. Sci. 41 : 179 (1945).

Calamagrostis welwitschii Rendle in Cat. Afr. Pl. Welw. 2 : 205 (1899). Angola. Non *Agrostis welwitschii* Steud. (1854).

Calamagrostis huttoniae Hack. in Rec. Albany Mus. 1 : 113 (1904), nomen ; l.c. 340 (1905), descr. ; Wood, Natal Pl. 5 : t. 482. Natal.

Agrostis papposa Mez in Fedde, Repert. 18 : 2 (1922). South Africa : Cape Province and Natal.

Distr. Angola ; Nyasaland (Zomba Plateau) ; Southern Rhodesia ; Natal. Recorded also by Goossens and Papendorf (l.c.) from the Transvaal, Basutoland and Cape Province.

ERAGROSTEA

Eragrostis fluviatilis A. Cheval. in Bull. Mus. Hist. Nat. Paris, sér. 2, 20 : 472 (1948), et in Rev. Bot. Appl. 29 : 132, tab. 9B (1949), descriptio hic emendata. Species affinis *E. charienti* (Schult.) Hitchc., sed culmis

persistentibus lignosis compressis superne ramosis plerumque multinodibus, foliorum vaginis ore glabris, panícula laxissima, lemmatibus longioribus differt.

Gramen perenne, caespitosum, circiter 90 cm. altum ; innovationes extravaginales, compressae. *Culmi* erecti, graciles vel validiusculi, inferne compressi et usque 3 mm. lati, superne teretes, rigidi, demum lignosi, persistentes, plerumque multinodes, primo simplices, demum stoloniformes et e nodis superioribus ramosi et radicales, glabri. laeves. *Folia* pallide viridia, glabra ; vaginae basales basin versus purpureo-tinctae, inferiores compressae, carinatae, usque 15 cm. longae, superne attenuatae, laeves, tenuiter striatae, internodiis longiores, superiores angustae, internodiis demum breviores ; ligulae truncatae, brevissimae, minute ciliatae ; laminae anguste lineares, tenuiter acutae, siccitate subsetaceae et involutae, usque 20 cm. longae, explanatae usque 3.5 mm. latae, erectae, subtus laeves, supra arcte nervatae, nervis dense et minute asperulae. *Panícula* oblonga vel ovata, laxissima, 12–25 cm. longa. 5–10 cm. lata ; axis primarius gracillimus, glaber, laevis ; rami filiformes, plerumque solitarii, patentes, flexuosi, laxissime divisi et sparse spiculati, laeves, inferiores usque 12 cm. longi et 2.5–5 cm. distantes ; pedicelli valde inaequales, laterales 0.5–2 mm. longi, terminales usque 2.5 cm. longi. *Spiculae* patulae vel demum ramis appressae, anguste oblongae, 8–16 mm. longae, 2–2.7 mm. latae, 9–20-florae, a latere compressae, strictae vel curvatae, pallide cinereae vel nervis viridibus exceptis albidovirides, glabrae ; rhachilla persistens, internodiis usque 0.8 mm. longis. *Glumae* explanatae oblongae, acutae, carinatae, membranaceae, 1-nerves, carina supra medium minute scaberulae ; inferior 2 mm. longa ; superior 2.5 mm. longa. *Lemmata* contigua, marginibus demum incurvis, a latere visa lanceolato-oblonga, acuta vel subobtusata, explanata oblonga vel elliptico-oblonga, 2.5–2.7 mm. longa, carinata, membranacea, carina prope apicem minute scaberula. *Palea* oblonga, obtusa, lemma aequans vel eo paullo brevior, carinis scaberula. *Antherae* 3, 1–1.5 mm. longae. *Caryopses* ellipsoidea, 0.8 mm. longa.

SIERRA LEONE : Mafindo Falls, Moa River, near Kailahun, on rocks among sand banks in the middle of the river bed, Feb. 12, 1944, *Deighton* 4005.

FRENCH SUDAN : rapids of the R. Niger from Bamako towards Quignola, Jan. 21, 1899, *Chevalier* 254 (not seen).

IVORY COAST : bed of the R. Bandama, near Tiassalé, on rocks submerged part of the year and on sand banks, Feb. 1948, *Chevalier* s.n.

GOLD COAST : Volta River District ; Senchi, between large and scattered stones and rocks in the middle of the Volta River, January 1935, *Irvine* 2627.

NIGERIA : Abeokuta Province ; Egba District, Olokemeji Forest Reserve, bed of River Ogun (at time of collection with large pools only), in crevices of rocks near water, Jan. 29, 1947, *R. W. J. Keay in Forest Herbarium, Ibadan* 21155. Oyo Province ; Oyo District, River Ogun, between Oyo and Iseyin, in sand and in crevices of gneiss boulders in river-bed, base often in water and doubtless under water in wet season, abundant, Feb. 4, 1948, *J. P. M. Brenan and R. W. J. Keay* 8958.

A compactly tufted perennial, with a well-developed root-system firmly fixing it in its aquatic habitat. It is remarkable on account of the persistence of the flowering culms, which become woody and function as stolons by branching and rooting from the nodes, particularly in the upper portion. In *Eragrostis chariis* (Schult.) Hitchc. the leaf-sheaths are usually bearded at the mouth, and the florets besides being smaller (rarely more than 2 mm. long), are closer together due to the very short internodes of the rhachilla.

The West African material of *Eragrostis chariis* (Schult.) Hitchc. was identified as *E. gangetica* (Roxb.) Steud. in Hutchinson and Dalziel's Flora of West Tropical Africa (2 : 516, 1936), following Stapf's conception of the latter (in Dyer, Fl. Cap. 7 : 617, 1900). A re-reading of the description of *Poa gangetica* Roxb. —the basis of *Eragrostis gangetica* Steud.—drew attention to some discrepancies (in particular the linear 20-50-flowered spikelets between it and the African and Indian plants referred to it at Kew. An examination of the drawing of *Poa gangetica* in Roxburgh's Icones Ined. tab. 2111 at Kew showed it to be the annual species named *Eragrostis stenophylla* Hochst. ex Miq. (in Hook. f. Fl. Brit. Ind. 7 : 318, 1896) and *E. cambessediana* (Kunth) Steud. (in Hutchinson & Dalziel, Fl. W. Trop. Afr. 2 : 515, 1936), an identification which was confirmed by the discovery of an authentic specimen of *Poa gangetica* in the British Museum Herbarium.

Eragrostis arenicola C. E. Hubbard, sp. nov. ; affinis *E. ciliari* (L.) R. Br., sed inflorescentiis elobatis erectis rigidioribus plerumque latioribus et laxioribus, spiculis et lemmatibus paulo majoribus, lemmatis carinis eciliatis, fructu plerumque majore anguste ovoideo vel ovoideo-oblongo differt.

Gramen annuum, 15-45 cm. altum. *Culmi* laxe vel dense fasciculati, vel solitarii, erecti vel geniculato-adscendentes, graciles vel gracillimi, teretes, 1-5-nodes, e nodis inferioribus ramosi, vel simplices, glabri, laeves, infra nodos glandium epidermalium parvularum annulo praediti, internodio supremo plerumque longissimo e vagina superiore longe exserto. *Foliorum vaginæ* internodiis demum breviores, striatae, saepe purpurascens, pilis e tuberculis minutis ortis sparse pilosae vel marginibus apicem versus saepe ciliatis exceptis glabrae, ore laxe et transverse barbatae ; ligulae ad seriem ciliatorum brevissimorum redactae ; laminae lineares, in acumen setaceum longe attenuatae, 3-15 cm. longae, 2-6 mm. latae, planae vel siccitate superne involutae, virides vel glaucae, minute et obscure scaberulae, ore pilis longiusculis laxe barbatae, ceterum glabrae. *Panícula* lineari-oblonga vel anguste oblonga vel lanceolata, contracta et densa vel laxiuscula, 4-22 cm. longa, 0.5-2.5 cm. lata, erecta, purpurea, vel purpureo- et pallide viridi-variegata, vel viridis ; rhachis et rami minute scaberuli, glabri vel nodis sparse pilosi ; rami gracillimi, angulati, erecti vel leviter patentes, plerumque solitarii, dense vel laxiuscule spiculati, usque 4 cm. longi ; pedicelli inaequales, 0.6-2 mm. longi, scaberuli. *Spiculae* oblongae vel late ovato-oblongae, 2.5-4 mm. longae, 1.5-2.5 mm. latae, 6-12-florae ; rhachilla supra glumas et inter anthoecia articulata, internodiis glabris 0.2-0.3 mm. longis. *Glumae* paullo inaequales, explanatae lanceolato-oblongae vel oblongae vel ovatae, acutae, carinatae, 1-nerves, tenuiter membranaceae, carina scaberulae ; inferior 1-1.6 mm. longa ; superior 1.3-2 mm. longa. *Lemmata*

imbricata vel demum contigua, explanata late oblonga vel oblongo-elliptica, apice rotundato-truncata, 1.3-1.5 mm. longa, membranacea, prominenter 3-nervia, nervis minute scaberula, glabra. *Paleae* lemmatibus paullo breviores, oblongae, truncatae vel truncato-emarginatae, carinis ciliis patentibus usque 0.7 mm. longis e tuberculis minutis ortis dense et rigide ciliatae. *Antherae* 2-3, oblongae, 0.3-0.6 mm. longae, purpureae. *Fructus* anguste ovoideus vel ovoideo-oblongus, 0.6-0.7 mm. longus, castaneus, laevis.

NORTHERN NIGERIA : Zaria Province ; Samaru, on farmland, 600 m., Nov. 29, 1948, *Thatcher* S.552. Zaria District, *Taylor* 22.

FRENCH EQUATORIAL AFRICA : South Bozoum (Bosum), 16° 20' E., 6° 20' N., in old plantations near a temporary swamp, Nov. 15, 1933, *Tisserant in Herb. Le Testu* 3374.

ANGLO-EGYPTIAN SUDAN : Imatong Mountains ; Katire, on path, 1080 m., Dec. 17, 1935, *Thomas* 1607.

TANGANYIKA TERRITORY : Iringa Province ; Mbeya District, Mbozi Region, *Jacobsen* 37. Kyimbila District, Massako, Nov. 4, 1912, *Stolz* 1648a.

NYASALAND : North Nyasa District ; Fort Hill, Tanganyika Plateau, 1050-1200 m., July 1896, *Whyte*. Between Mpata and commencement of Tanganyika Plateau, 600-900 m., July 1896, *Whyte*. West Nyasa District ; Luwagi, old garden sites on good red loam, 450 m., April 4, 1938, *Fenner* 330. Mombera District ; Mzimba, Ekwendeni area, 1937, *Wilson* 24, 26. Kota-Kota District ; Chia area, sandy beaches of streams, 480 m., Sept. 4, 1946, *Brass* 17521. South Nyasa District ; Katema (Chimsak), due west of Fort Johnston, native gardens, footpaths, on light soils, 900 m., April 20, 1937, *Lawrence* 386. Neighbourhood of Zomba, c. 900 m., 1936, *Cormack* 53, 84, 138, 197, 231, 272, 304.

PORTUGUESE EAST AFRICA : Nyassa District ; Massangulo, abundant on dry argillaceous soils, 330 m., April 1935, *Gomes e Sousa* 1414.

NORTHERN RHODESIA : Broken Hill, May 28, 1914, *Rogers* 7686. Broken Hill School grounds, March 1936, *Govt. School* 35. Near Mumbwa, 1911, *Macaulay* 21. Mazabuka, ruderal in sandy places, 1080 m., April 8, 1932, *Trapnell* 1072 ; *ibid.*, May 1932, *Trapnell* 2029 b. Kafue District ; Chikupi, c. 900 m., August 18, 1929, *Sandwith* 16. Pemba, in swamps, 1200 m., May 1932, *Trapnell* 2029a. Choma, May 1909, *Rogers* 8004. Kalomo, May 1914, *Rogers* 7709.

SOUTHERN RHODESIA : Marandellas, edge of vleis and in sand veld, 1620 m., April 10, 1930, *Rattray* 88. Salisbury, 1440 m., April 1920, *Eyles* 2190 (Type), 2508. Hartley District ; Makwiro, 1290 m., April 1920, *Mainwaring in Herb. Eyles* 2209. Poole Farm, Hartley, ruderal, 1200 m., April 17, 1944, *Hornby* H.2359 (*S. Rhod. Govt. Herb.* 12510). Mashonaland, May 1931, *Fitt* 170. Trelawney, Tobacco Station, 1350 m., June 16, 1943, *Jack* 214 (*S. Rhod. Govt. Herb.* 10247). Zimbabwe, August 15, 1929, *Hitchcock* 27320.

This annual weed is of fairly frequent occurrence in south-east tropical Africa, where it has occasionally been confused with its close relative,

E. ciliaris (L.) R. Br. From this species, typical plants may be distinguished by the stiffer more erect and relatively looser inflorescences, and by the slightly larger glumes, lemmas and seeds. When the panicles are congested and rather dense, however, the most reliable distinguishing character is to be found in the absence of cilia on the lower half of the keels of the lemma. In *E. ciliaris*, these cilia are at first somewhat obscure, being tightly adpressed to the middle nerve, but at maturity they spread so as to push the lemmas apart, in this way creating the dense lobed inflorescence of rather woolly spikelets which is such a characteristic feature of this widespread tropical species.

Eragrostis phaeantha C. E. Hubbard, sp. nov. ; ab *E. macilentae* (A. Rich. Steud., habitu perenni, foliorum laminis latioribus, glumis et lemmatibus longioribus, lemmatibus a latere visis late lanceolatis vel oblongo-lanceolatis acutis differt.

Gramen perenne caespitosum, circiter 80 cm. altum. *Culmi* numerosi, erecti, validiusculi, teretes vel uno latere sulcati, 5-nodes, e nodis inferioribus ramosi, ramis erectis solitariis, purpurei, nitentes, glabri, laeves. *Foliorum vaginæ* glabrae, laevissimae, striatae, inferiores et intermediae persistentes, compressae, carinatae, latiusculae, demum stramineae, internodiis longiores, superiores teretes, internodiis breviores ; ligulae ad seriem densam ciliorum brevissimorum redactae ; laminae lineares, in apicem gracillimum obtusum gradatim attenuatae, usque 35 cm. longae et 1 cm. latae, planae vel siccitate conduplicato-convolutae, firmae vel rigidiusculae, pilis patulis demum deciduis plus minusve pilosae vel glabrescentes vel glabrae, tenuissime nervatae, apicem versus et marginibus scaberulae, ceterum laeves. *Panicula* erecta, laxa, ovato-oblonga, 33 cm. longa, 10 cm. lata ; rhachis striata, laevis, glabra, superne flexuosa ; rami solitarii, oblique patentes, prope basin et superne laxè divisi, tenuiter filiformes, flexuosi, laeves, usque 12 cm. longi ; pedicelli patentes, 10–23 mm. longi, minute et obscure scaberuli. *Spiculae* lanceolato-oblongae vel oblongae, 4–7 mm. longae, circiter 2 mm. latae, 4–8-florae, atro-olivaceae vel nigricantes, glabrae ; rhachilla glabra, laevis, continua, internodiis 0.6–0.8 mm. longis. *Glumae* a latere visae lanceolatae, acutae, oblique patentes, demum deciduae, carinatae, carinis scaberulis, tenuiter membranaceae, 1-nerves, subaequales ; inferior explanata lanceolata, 2.5–2.8 mm. longa ; superior explanata oblongo-lanceolata, 2.8–3 mm. longa. *Lemmata* erecta, contigua, a latere visa late lanceolata vel oblongo-lanceolata, acuta, explanata elliptico-ovata, 2.5–2.8 mm. longa, supra medium carinata, carinis apicem versus leviter scaberula, ceterum laevia, 3-nervia, nervis lateralibus infra apicem evanescentibus. *Paleae* lemmatibus paullo breviores, oblongae, truncatae, carinis laeves. *Antherae* 3, 1 mm. longae. *Fructus* late elliptico-oblongus, 1–1.2 mm. longus, obtuse quadrangularis, 0.6–0.7 mm. latus, pallide brunneus.

NYASALAND : Mlanje District ; Mlanje Mountain, Lucheny Plateau, frequent on forest paths and open banks of stream in forest, 1820 m., July 1, 1946, *Brass* 16567.

Eragrostis emsonii C. E. Hubbard, sp. nov. ; affinis *E. phaeanthae* C. E. Hubbard, sed culmis simplicibus 1–3-nodibus, foliorum vaginis

inferioribus hirsutis vel hispidis, laminis angustioribus, ramis et ramulis scabridis, rhachillae internodiis et palearum carinis scaberulis differt.

Gramen perenne, dense caespitosum, 20–75 cm. altum ; innovationes intravaginales. *Culmi* erecti, validiusculi, teretes, usque 2.6 mm. diametro, simplices, 1–3-nodes, glabri, laeves. *Foliorum vaginae* firmae, striatae, basales latiusculae, persistentes, imbricatae, compressae, carinatae, pilis patulis demum deciduis e tuberculis minutis ortis densiuscule hirsutae vel hispidae, vel glabrescentes, intermediae et superiores fere teretes vel teretes, plus minusve hirsutae, vel glabrae et laeves, internodiis breviores ; ligulae ad seriem densam ciliorum brevissimorum redactae ; laminae lineares, in acumen tenuissimum longe attenuatae, 8–25 cm. longae, 2–5 mm. latae, planae vel siccitate convolutae, erectae, firmae vel rigidiusculae, virides, ut vaginas supra hirsutae (praecipue inferiores), vel sparse hirsutae vel subtile glabrae, tenuissime nervatae, nervis scabridae. *Panicum* laxissima, ambitu ovata vel ovato-oblonga vel oblonga, 10–26 cm. longa, usque 14 cm. lata ; rhachis striata, scabrida, glabra ; rami plerumque solitarii, laxè divisi, demum patentes, flexuosi, filiformes, ut ramulos scabridi, usque 10 cm. longi ; pedicelli capillares, 6–27 mm. longi, scabridi. *Spiculae* lanceolato-oblongae vel oblongae, 4–8 mm. longae, 1.5–2 mm. latae, 4–9-florae, atro-olivaceae, vel purpureo-nigricantes ; rhachilla persistens, flexuosa, gracillima, internodiis scaberulis vel minute hispidulis 0.7–1 mm. longis. *Glumae* a latere visae anguste lanceolatae et acutae, explanatae oblongo-lanceolatae vel oblongo-ovatae, carinatae, carinis scaberulae, 1-nerves, membranaceae, aequales vel paullo inaequales ; inferior 2–2.5 mm. longa ; superior 2–3 mm. longa. *Lemmata* a latere visa oblongo-lanceolata vel anguste oblongo-ovata, acuminata, acuta, explanata late ovato- vel oblongo-elliptica, 2.3–3 mm. longa, imbricata vel arcte contigua, carinis apicem versus scaberula, glabra, firme membranacea, 3-nervia, nervo medio in mucronem brevissimum excurrenti, nervis lateralibus infra apicem evanescentibus. *Paleae* oblongae, obtusae, lemmatibus paullo breviores, inter carinas scaberulas concavae. *Antherae* 1 mm. longae, brunneae. *Fructus* oblongus, 1 mm. longus, obtuse trigonus, castaneus.

TANGANYIKA TERRITORY : Iringa Province ; Iringa, *Emson* 436 (Type) ; Mahanga Hill, Mufindi, prominent grass in open mountain grassland, 1950 m., Feb. 1931, *Davies* A.5 ; Mufindi, 1950 m., in forest belt, *Davies* B.12 ; Njombe, Jan. 7, 1932, *Lynes* Fj.99 ; Ukinga, Upangwa —E. Ubena, *Hill* H3-30-6.

Eragrostis canescens C. E. Hubbard, sp. nov. ; affinis *E. hispidae* K. Schum., sed laminis longioribus, paniculis majoribus, ramis rigidioribus plus minusve strictis, spiculis laxè dispositis, glumis brevioribus, lemmatibus latoribus supra medium nervibus evanescentibus, palearum carinis scaberulis differt.

Gramen perenne, densissime caespitosum, usque 50 cm. altum ; innovationes intravaginales. *Culmi* erecti, gracillimi, teretes, simplices, basin versus vaginati, enodes, pilis albis longiusculis appressis vel leviter patentibus pilosi, vel glabrescentes vel glabri. *Foliorum vaginae* arcte appressae, angustae, tenuiter striatae, imbricatae, firmae, marginibus membranaceae, laxè pilosae vel glabrescentes, vel glabrae, basales

persistentes, in fibras demum fissae; ligulae ad seriem ciliorum minorum redactae; laminae filiformes, breviter acutae vel obtusae, usque 30 cm. longae, arcte conduplicato-convolutae, teretes, 0.3–0.6 mm. diametro, rigidae, erectae et strictae vel plus minusve curvatae, glauco-virides, laeves, vaginam versus pilosae, ceterum sparse pilosae vel glabrae. *Panicula* erecta, lanceolata vel lanceolato-elliptica, deinum laxiuscula, 12–30 cm. longa, usque 6 cm. lata, canescens; rhachis sulcata, pilosa vel glabra, rigida, in setam tenuissimam terminata; rami solitarii, erecti vel oblique patentes, angulares, stricti vel leviter flexuosi, laxè divisi, scaberuli, usque 8 cm. longi, basin versus pilosi vel omnino glabri, in setam tenuissimam scaberulam usque 10 mm. longam terminati; pedicelli capillari, flexuosi vel curvati, laeves, usque 6 mm. longi, apice incrassati. *Spiculae* ovatae, late ovatae, oblongo-ovatae vel late oblongae, latere compressae, 5–9 mm. longae, 2.5–4 mm. latae, 5–20-florae, dense pilosae, olivaceo-cinereae; rhachilla persistens, flexuosa, glabra, laevis, internodiis 0.5 mm. longis. *Glumae* tenuiter membranaceae, 1-nerves, pilis albis longiusculis plus minusve appressis vel patulis densiuscule pilosae; inferior explanata ovata, obtusa, 2–2.5 mm. longa; superior explanata late ovata, obtusa, 2–3 mm. longa. *Lemmata* imbricata, demum oblique patentia, a latere visa elliptica vel semi-ovato-elliptica, explanata late elliptica, breviter acuta vel obtusa, 2–3 mm. longa, tenuiter membranacea, ut glumis pilosa, 3-nervia, nervis supra medium evanescentibus. *Paleae* late obovatae, emarginatae vel obtusae, 2–2.3 mm. longae, membranaceae, inter carinas concavae, carinis minute scaberulae. *Lodiculae* obcuneatae, truncatae. *Antherae* 3, 1 mm. longae.

NYASALAND: North Nyasa District; Nyika Plateau, locally common on grasslands of plateau rim, a grass of the slopes not seen on open plateau, 2340 m., August 19, 1946, *Brass* 17334 (Type). Between Kondowe and Karonga, 600–1800 m., July 1896, *Whyte*. Nymkowa Mountain, growing plentifully near woods, 1950 m., Sept. 1902, *McClounie* 28. North Nyasaland: without precise locality, *Whyte*.

A member of a small group, including *E. longepaniculata* De Wild. and *E. hispida* K. Schum., in which many, if not all, of the primary ramifications of the inflorescence terminate in a fine naked bristle devoid of spikelets.

CHLORIDEAE

Chrysochloa hindsii C. E. Hubbard, sp. nov.; a speciebus ceteris habitu annuo, foliis spicis et spiculis brevioribus distinguenda.

Gramen annum, repens, stoloniferum; stolones graciles, e nodis radicales, internodiis compressis usque 2.5 cm. longis glabris. *Culmi* laxè fasciculati, geniculato-ascendentes, usque 16 cm. alti, gracillimi, 1–3-nodes, simplices vel ramosi, superne teretes, glabri, laeves, internodio summo filiformi e vagina demum longe exserto. *Foliorum* vaginae glabrae, laeves, basales latere compressae, acute carinatae, breves, arcte imbricatae, marginibus membranaceis exceptis firmas, intermediae et summae internodiis demum breviores, summae angustissimae, elongatae, convolutae, ecarinatae; ligulae brevissimae, truncatae, minute ciliolatae; laminae arcte conduplicatae et carinatae vel demum explanatae et anguste oblongae, apice rotundatae vel leviter emarginatae, rigidae,

glauco-virides, glabrae, marginibus incrassatis et carina scabridae, ceterum laeves, inferiores 0·8–3 cm. longae et 2·5–5 mm. latae, summae ad mucronem redactae. *Spicae* 2–4-natae, rarissime solitariae, 2–4·5 cm. longae, erectae vel demum patentes, gracillimae, strictae; rhachis gracillima, triquetra, 0·4–0·6 mm. lata, marginibus minute scaberula. *Spiculae* subsessiles, oblongae vel ellipticae, dense imbricatae et arcte appressae, a latere valde compressae, 3–4 mm. longae, pallide virides vel flavido-virides vel purpurascentes. *Glumae* subaequales et spiculae aequilongae, vel inferior superiore paullo brevior, carinatae, carina viridi minute scaberulae, 1-nerves, membranaceae, translucens, demum scariosae; inferior plus minusve persistens, explanata anguste lanceolato-oblonga, obtusa; superior decidua, explanata late lanceolata vel ovata, obtusa, prope apicem breviter mucronata. *Anthoecium inferum* ♂: callus brevissimus, obtusus; lemma carinatum, explanatum ovatum vel elliptico-ovatum, subacutum, integrum, 2·8–3·2 mm. longum, nervo medio (carina) pilis appressis et nervis lateralibus pilis longioribus patentibus usque 2 mm. longis dense albo-ciliatum, membranaceum, demum scariosum, translucens, prominenter 3-nerve, aristatum; arista subterminalis, tenuissima, 1–1·6 mm. longa; palea lanceolata, obtusa, 2·5–2·8 mm. longa, carinis brevissime ciliata; antherae 0·6 mm. longae; caryopsis obtuse trigona vel fere teres, ambitu elliptica, pallide brunnea, 1·6–1·8 mm. longa. *Anthoecium superum* sterile, angustum; lemma explanatum oblongo-ellipticum, obtusum, exaristatum, 1·7–2 mm. longum, glabrum.

GOLD COAST: Northern Territories; Babile, on bare expanses of dense silt baking hard in the dry season, 300 m., October 7, 1947, *J. Hinds* 5000 (Type); Lawra, *J. Hinds* 3801.

ARUNDINELLEAE

Trichopteryx decumbens C. E. Hubbard, sp. nov.; affinis *T. marungensi* Chiov., sed foliorum vaginis dense et minute pubescentibus, laminis angustioribus anguste lanceolatis vel anguste oblongo-lanceolatis subtus minutissime pubescentibus, glumis brevissime hispidulis, aristis sine columnis, anthoecio infero hermaphrodito distinguenda.

Gramen perenne, laxum. *Culmi* e basi decumbente geniculato-adscendentes, usque 40 cm. longi, gracillimi, teretes, usque 1 mm. diametro, rigidi, hic illic ramosi, vel simplices, usque 10-nodes, pilis appressis mollibus brevissimis e papillis minutis ortis densiuscule pubescentes vel villosuli. *Foliorum vaginae* internodiis tandem multo breviores, teretes, arcte appressae, tenuiter striatae, pilis brevissimis e papillis minutis ortis dense pubescentes, nodis villosulae, marginibus ciliolatae, ore pilis 2–3 mm. longis barbatae, inferiores 1–2 cm. longae, superiores usque 5 cm. longae; ligulae ad seriem ciliorum redactae; laminae anguste lanceolatae vel oblongo-lanceolatae, basi abrupte contractae, supra medium in acumen acutum gradatim attenuatae, 2–4 cm. longae, 3–5 mm. latae, planae, tandem horizontaliter patentes vel leviter reflexae, virides, firmae, subtus minutissime et dense pubescentes, supra glabrae, marginibus cartilagineis albidis scaberulis uno margine crispo. *Panicula* tandem laxiuscula vel laxa, flexuosa, 5–12 cm. longa, usque 3 cm. lata; rhachis inferne pubescens, superne scaberula; rami capillares, flexuosi, bini, erecti, scaberuli, superne divisi, usque 6 cm. longi; pedicelli

1-3 mm. longi, scaberuli, glabri vel apice pilis albis paucis praediti. *Spiculae* anguste lanceolatae, tandem anguste oblongae et hiantes, 4.3-5 mm. longae, flavido-brunneae. *Glumae* membranaceo-chartaceae, 3-nerves, pilis brevissimis e papillis minutis brunneis ortis hispidulae; inferior anguste ovata, acuta, 2.5-3.5 mm. longa, pilis paucis longioribus nonnunquam aspersa; superior lanceolata, tenuiter acuta, spiculam aequans. *Anthoecium inferum* ♂: lemma glumae superiori simile sed membranaceum, fere glabrum; palea lineari-oblonga, obtusa, 3.5 mm. longa, carinis apicem versus scaberula. *Anthoecium superum* ♀: callus brevissimus, truncatus, pilis 1 mm. longis barbatus; lemma 2.5 mm. longum (lobis exclusis), bilobum, lobis 0.5 mm. longis in setam capillarem circiter 3 mm. longam attenuatis, membranaceum, tenuissime 5-nerve, infra medium minute et appresse pubescens, prope medium margines versus pilis 1 mm. longis dense barbatus; arista curvata, 8-9 mm. longa, sine columna; palea lineari-oblonga, obtusa, 2.6 mm. longa. *Antherae* 1-1.2 mm. longae.

NORTHERN RHODESIA: Mwinilunga District; River Dobeka, south of Dobeka Bridge, on vertical mossy bank just above water, frequently submerged; perennial, stem more or less decumbent; Dec. 17, 1937, *Milne-Redhead* 3705.

Trichopteryx decumbens differs from all the species of the genus in possessing a hermaphrodite lower floret. It is true that in the tribe *Arundinelleae* to which *Trichopteryx* belongs, spikelets with the lower floret hermaphrodite have been found from time to time but these are only isolated examples in inflorescences otherwise typical of the tribe, whereas in our new species a well-developed pistil—not in the least vestigial—has been found in every one of the ten spikelets dissected. *T. decumbens* is also remarkable in that there is practically no development of the column to the awn, other than an extremely obscure brown portion at its junction with the lemma.

Among the other perennial species of *Trichopteryx*, *T. fruticulosa* Chiov. may be distinguished from *T. decumbens* by its different habit, the stouter more erect culms being clothed at and near the base with relatively broad cataphylls, and usually much-branched upwards, also by the leaf-sheaths usually enveloping the internodes, and by the reflexed leaf-blades. Two more perennial species, *T. dregeana* Nees and *T. gracillima* C. E. Hubbard have relatively narrower linear or very narrowly lanceolate leaf-blades, elongated more or less trailing or rambling wiry culms, and a distinct brown column to the awn.

Danthoniopsis lignosa C. E. Hubbard, sp. nov.; a *D. wasaënsi* C. E. Hubbard, culmis validioribus plurinodibus rigidioribus lignosis, foliis fere glabris, panícula oblonga densissima angustiore, rhachi glabra, spiculis minoribus, glumis 3-5-nervibus mucronatis, aristis brevioribus distinguenda.

Gramen perenne, caespitosum, circiter 2 m. altum. Culmi erecti, validi, rigidi, teretes, usque 5 mm. diametro, lignosi, plurinodes, superne ramosi, ramis erectis, pallide virides, glabri, laevissimi. *Foliorum vaginæ* teretes, coriaceae, glabrae, laeves, inferiores latae, demum stramineae, internodiis longiores, superiores virides, internodiis demum breviores; ligulae ad seriem ciliorum redactae; laminae anguste lineares, in

acumen setaceo-acutum longe attenuatae, usque 50 cm. longae, siccitate convolutae, explanatae usque 5 mm. latae, supra arcte nervatae et prope basin pilosae, ceterum glabrae, subtus prope margines scaberulae, marginibus spinuloso-scabridae, ceterum laeves. *Panicula* oblonga, contracta, basi interrupta excepta densissima, 10–16 cm. longa, 2.5–3 cm. lata, pallida; rhachis gracilis, superne sparse scaberula, glabra; rami fasciculati, suberecti, filiformes, usque 4 cm. longi, flexuosi, scaberuli, nonnunquam pubescentes, divisi, ramulis brevibus arcte spiculatis; pedicelli inaequales, 1–3 mm. longi, glabri, *Spiculae* oblongae, hiantes, 5–6 mm. longae, pallide stramineae vel purpureo-tinctae. *Glumae* ovatae, acutae, mucronatae, scarioso-chartaceae, minute pubescentes; inferior 2.5–3.5 mm. longa, 3–5-nervis; superior limbate infero paullo brevior vel ei aequilonga, acuminata, 5-nervis. *Anthoecium inferum* ♂: lemma spiculae aequilongum, ovatum, acute acuminatum, mucronatum, scarioso-chartaceum, 7–9-nerve, minute pubescens; palea oblonga, obtusa, 3–3.5 mm. longa, membranacea, carinis scabrido-ciliolata. *Anthoecium superum* oblongum: callus late truncatus, 0.5 mm. longus, lateribus pilis 1 mm. longis barbatus; lemma 3 mm. longum lobis inclusis), acute bilobum, lobis breviter mucronatis, demum tenuiter coriaceum, 11-nerve, pubescens, prope medium fasciculis 8 pilorum alborum 2 mm. longorum transverse barbatus; arista geniculata, scaberula, 7–8 mm. longa, columna aurea 2 mm. longa; palea anguste oblonga, carinis superne angustissime alatis. *Antherae* 3, 2 mm. longae.

ANGOLA: Huilla District; Ruacana, near R. Cunene, 900 m., June 7, 1937, *Gossweiler* 11051.

The culms are remarkably thick-walled and woody and in this respect very different from those of all species of *Danthoniopsis* with the exception of *D. pruinosa* C. E. Hubbard. It may be readily distinguished from that species, however, by its narrower convolute leaf-blades, pale stramineous spikelets, 3 5-nerved glumes, 7–9-nerved lower lemma, 11-nerved upper lemma, and by its shorter awns.

Loudetia esculenta C. E. Hubbard, sp. nov.; a *L. superba*¹ De Not., panicula laxiore, rhachi glabra, glumis tenuioribus, gluma superiore truncata, lemmate infero setaceo-acuto 3-nervi, anthoecii superi callo truncato vel leviter emarginato, antheris 2 differt.

Gramen annuum? (basis ignota). *Culmi* alti, validiusculi, teretes, prope nodum summum 4 mm. diametro et ibi ramosi, ramo erecto panicula terminato, rigidi, glabri, laeves, internodio summo (pedunculo) e vagina longe exserto. *Foliorum vaginae* elongatae, teretes, glabrae, laeves, purpureo-tinctae; ligulae ad seriem densam ciliorum redactae; laminae lineares, basin versus attenuatae, 40 cm. longae, 11 mm. latae, planae, firmae, virides, glabrae, asperulae. *Panicula* erecta, leviter contracta, usque 35 cm. longa et 7 cm. lata, flavido-brunnea; rhachis stricta, rigida, glabra, inferne laevis, superne scabrida; rami erecti, graciles, stricti, angulati, scabridi, laxo ramosi, ramulis ad ramos appressis 2-spiculatis, inferiores et intermedii verticillati, usque 18 cm. longi, superiores bini vel solitarii; pedicelli scabridi, inaequales, laterales 3–5 mm. longi, terminales 10–23 mm. longi. *Spiculae* lanceolatae, acuminatae, obtusae, 22–32 mm. longae, flavido-brunneae. *Glumae* chartaceo-coriaceae, glabrae, laeves; inferior lanceolata, acuta,

10-15 mm. longa, 3-nervis; superior linearilanceolata, acuminata, apice truncata, spiculum aequans, 3-nervis. *Anthoecium inferum* ♂: lemma oblongo-lanceolatum, acuminatum, setaceo-acutum, 17-24 mm. longum, glumis simile; palea anguste oblongo-lanceolata, obtusa, usque 15 mm. longa, membranacea, carinis anguste alatis; antherae 2, 8 mm. longae. *Anthoecium superum* anguste oblongum: callus usque 2 mm. longus, pilis usque 4 mm. longis sericeo-barbatus, truncatus vel leviter emarginatus; lemma 10.5-13 mm. longum (lobis exclusis), bilobum, lobis 2-2.5 mm. longis lanceolatis setaceo-acutis 1-nervibus, coriaceum, 7-nerve, dense pubescens; arista geniculata, 8-11 cm. longa, columna flavida dense scabro-hispida 3-5 cm. longa; palea anguste oblonga, lemma aequans, nervis incrassatis approximatis, glabra; antherae 2, 6.5 mm. longae.

ANGLO-EGYPTIAN SUDAN: Equatoria Province; Abu Satta Hills, Tambura, Sept. 20, 1947, Mrs. Culwick 26 (85).

Although compared with *L. superba* of sect. *Paratristachya*, which it superficially resembles on account of the very large spikelets, this new species should be classified in the sect. *Eu-Loudetia*, but all the species of that section so far described have considerably smaller spikelets. It is known as "Tudu" by the natives who use the seeds as a food, as they do those of a new species of *Hyparrhenia* from the same locality.

A very young but otherwise complete specimen of probably the same species of *Loudetia* was collected by the late Dr. J. G. Myers (no. 6991) in July 1937 on the top of the rocky hill Mt. Nakbi, between Yambio and Tambura. It is a tufted annual about 75 cm. high, with slender simple erect 3-noded culms, leaf-blades up to 36 cm. long and 2.5-4 mm. wide, and panicles 15-18 cm. long. The spikelets are insufficiently developed for description, but the lower glume (11 mm. long) and the upper glume (21 mm. long) are similar to those of the new species. According to Myers this grass is known as "Mvua-Mbia" to the Zande and as "Laipa" to the Kakwa peoples.

Loudetia simulans C. E. Hubbard, sp. nov.; a *L. anomala* C. E. Hubbard et Schweickerdt, foliorum laminis longioribus dense asperulis, glumis oblongo-ovatis, gluma inferiore mucronata, gluma superiore 7-9-nervi, lemmate supero dorso glabro, paleae superioris carinis superne ciliatis differt.

Gramen perenne, dense caespitosum, 1.5-2 m. altum; innovationes intravaginales. Culmi erecti, validi, leviter compressi, usque 6 mm. lati, rigidi, simplices, circiter 3-nodes, internodiis inferioribus sericeo-villosi vel nisi nodos versus demum glabri, internodiis superioribus glabri, laeves. *Foliorum vaginæ* ore breviter auriculatae et dense et breviter barbatae, basales usque 20 cm. longae, laxae, internodiis longiores, compressae, leviter obtuse carinatae, tenuiter striatae, basi dense villosae, superne laxae vel sparse pilosae vel glabrescentes, asperulae, superiores apicem versus carinatae, glabrae, laeves; ligulae ad seriem ciliorum redactae; laminae anguste lineares, in acumen setaceum attenuatae, usque 55 cm. longae, siccitate convolutae, explanatae usque 6 mm. latae, firmae, arcte nervatae, dense asperulae, glabrae. *Panicula* erecta, laxa, oblonga, usque 55 cm. longa et 15 cm. lata; rhachis gracilis, nodis villosula, ceterum glabra, scaberula; rami bini vel

solitarii, oblique patentes, filiformes, laxe divisi, striati vel angulati, scaberuli, basi villosuli, ceterum glabri, inferiores usque 30 cm. longi, a sese 4-9 cm. distantes; pedicelli inaequales, 3-10 mm. longi, glabri. *Spiculae* elliptico-oblongae, demum hiantes, 7-10 mm. longae, pallidae et purpureo-suffusae. *Glumae* oblongo-ovatae, scarioso-chartaceae, glabrae, minutissime asperulae; inferior acuta, 4-6 mm. longa, 5-nervis, mucronata, mucrone usque 1 mm. longo; superior obtusa vel bidentata, 6-9 mm. longa, lemmate supero plerumque paullo brevior, mucronulata, 7-9-nervis. *Anthoecium inferum* ♂: lemma spiculae aequilongum, ovato-oblongum, anguste truncatum vel bidentatum, mucronulatum, 7-nerve, glabrum; palea oblonga, breviter bifida, 5-6 mm. longa, membranacea, carinis angustissime alatis, alis superne minute ciliolatis. *Anthoecium superum* lanceolato-oblongum: callus truncato-rotundatus, usque 0.7 mm. longus, pilis albis usque 3.5 mm. longis dense barbatus; lemma 5.5-8 mm. longum (lobis inclusis), 2-lobum, lobis lanceolatis acutis mucronulatis 1-nervibus 1-2 mm. longis, coriaceum, 9-11-nerve, glabrum vel prope margines pilosum, laevissimum, nitens; arista geniculata, 8-13 mm. longa, minute scaberula, columna 4-5 mm. longa brunnea; palea anguste oblonga, carinis anguste alatis, alis rigidis inflexis superne ciliatis. *Antherae* 3, 2.5-3 mm. longae. *Caryopsis* anguste oblongo-elliptica, 5 mm. longa, brunnea.

FRENCH EQUATORIAL AFRICA: Oubangui-Chari; Bozoum Region, summit of the rock of Yaoyam, 20 km. east of Bozoum (Bosum), 1100 m., in clefts in the rock, Nov. 11, 1937, *C. Tisserant* 3601 (Typus) (Herb. G. Le Testu). Ouaka (Waka) District; on sandstone rocks near Balaongu village, 20 km. north-east of Bambari, Sept. 1, 1925, *C. Tisserant* 2018 (Herb. G. Le Testu).

This new representative of the section *Pleioneura*, like the other two species, *L. ramosa* (Stapf) C. E. Hubbard and *L. anomala* C. E. Hubbard et Schweickerdt, shows a close connection with the genus *Danthoniopsis* Stapf, especially in the colour of the spikelets (pale green and often suffused or tinged with purple), texture of the glumes (scarioso-chartaceous), nervation of the lower lemma (5-7-nerved), deep lobing of the upper lemma and in the keels of the palea of the upper floret being narrowly winged. Superficially it bears a marked resemblance to *Danthoniopsis chevalieri* A. Camus et C. E. Hubbard, but it may be readily distinguished by the absence of the transverse beard of long hairs on the upper lemma.

Loudetia echinulata C. E. Hubbard, sp. nov.; affinis *L. coarctatae* (A. Camus) C. E. Hubbard, sed habitu annuo, spiculis et aristis multo longioribus, gluma inferiore setulis rigidioribus praedita, callo oblique acuto differt.

Gramen annuum, usque 1.5 m. altum. *Culmi* erecti, e nodis inferioribus radicantes, graciliusculi, teretes, simplices vel prope basin rarissime ramosi, rigidi, 2-3-nodes, glabri, laeves. *Foliorum vaginae* internodiis multo breviores, teretes, firmae, glabrae, laeves; ligulae ad seriem ciliorum brevissimorum redactae; laminae angustissime lineares, setaceae, apice acutae, usque 15 cm. longae, involutae, 0.5-1 mm. diametro, explanatae usque 2 mm. latae, erectae, rigidae, subtus glabrae et laeves, supra arcte nervatae et minute scaberulae. *Panicula* spiciformis,

densa, erecta, 6-10 cm. longa et 6-8 mm. lata (aristis exclusis), flavida; rhachis glabra, laevis: rami erecti, appressi, usque 4 mm. longi, 2-1-spiculati, laeves; pedicelli laterales brevissimi, laeves. *Spiculae* erectae, imbricatae, anguste lanceolatae, acuminatae, 2.0-2.2 cm. longae. *Glumae* 3-nerves: gluma inferior anguste oblongo-lanceolata, obtusa, 11-12 mm. longa, coriacea, rigida, inter nervos laterales leviter carinatos dorso applanata, nervis lateralibus minute scaberulis setulis 1-1.7 mm. longis rigidis albis oblique patentibus e tuberculis atro-brunneis aequaliter dispositis ortis echinulata, ceterum laevis et glabra; gluma superior lineari-lanceolata, acuminata, apice rotundato-obtusa vel demum minute bifida, spicula paullo brevior, chartacea, supra medium minute scaberula, ceterum glabra et laevis. *Anthoecium inferum* ♂: lemma glumae superiori simile, longe acuminatum, obtusum, spiculam aequans, tenuiter chartaceum, glabrum, laeve; palea anguste oblonga, acuta, 11-13 mm. longa, firme membranacea, carinis angustissime alatis apicem versus minute scaberulis. *Anthoecium superum* anguste oblongum: callus oblique acutus, 1.5-2 mm. longus, pilis sericeis usque 2.5 mm. longis dense barbatus; lemma teres, marginibus involutum, 7 mm. longum, minutissime et obtuse bilobum, 7 nerve, tenuiter coriaceum, appresse pubescens; arista leviter geniculata, gracilis, usque 11 cm. longa, columna aurea scaberula et minute pubescente circiter 4 cm. longa, seta pallida; palea linearis, lemmati aequilonga. *Antherae* 2, 4-5 mm. longae, atro-purpureae.

FRENCH EQUATORIAL AFRICA: Oubangui-Chari; Ouaka (Waka) District, on wet gneiss rocks at Marama, 30 km. south of Ippy, October 10th, 1928, *C. Tisserant* 2712 (Herb. G. le Testu).

A very distinct species, characterised by its annual duration, prop-roots from the lower nodes, stiffly erect habit, wheat-like inflorescences, golden awns, and especially by the regularly spaced rigid white tubercled-based setulae borne in a single row along the lateral nerves of the lower glumes. The tubercles are larger and further apart, and the setulae are more rigid than those on the lower glumes of *L. coarctata*.

Loudetia villosipes *C. E. Hubbard*, sp. nov.; affinis *L. glabratae* (K. Schum.), *C. E. Hubbard*, sed culmis gracilioribus, foliorum laminis angustioribus involutis, gluma superiore lemmate infero brevior, anthoecii inferi paleae carinis ciliolatis, anthoecii superi callo brevissimo, arista brevior differt.

Gramen perenne, dense caespitosum, circiter 90 cm. altum; innovations intravaginales, basi bulboso-incrassati. *Culmi* erecti, graciliusculi, teretes, usque 2.5 mm. diametro, simplices, 2-3-nodes, glabri, laeves. *Foliorum vaginae* basales usque 14 cm. longae, imbricatae, tenuiter striatae, basi dense et molliter villosae, ceterum glabrae, laeves, in fibras demum fissae, internodiis multo longiores, intermediae et superiores teretes, arcte appressae, glabrae, internodiis demum paullo breviores; ligulae ad seriem pilorum brevissimorum redactae; laminae anguste lineares, acutae, usque 40 cm. longae, siccitate arcte involutae et circiter 1 mm. diametro, explanatae usque 4 mm. latae, erectae, rigidiusculae, glabrae, subtus laeves, supra tenuiter nervatae et minute scaberulae vel laeves. *Panícula* contracta, densiuscula, anguste oblonga, 25-30 cm. longa, 3-4 cm. lata, pallide aureo-brunnea; rhachis gracillima, glabra,

laevis vel superne minute scaberula ; rami 3-6-nati vel superne bini, tenuiter filiformes, usque 11 cm. longi, glabri, minute scaberuli, laxiuscule ramosi ; ramuli fasciculos e spiculis 2 vel plerumque 3 compositos gerentes ; pedicelli inaequales, tenuiter filiformes, 1-4 mm. longi, scaberuli. *Spiculae* lanceolatae vel anguste oblongae, 6.5-7 mm. longae. *Glumae* tenuiter chartaceae, 3-nerves ; inferior anguste ovata, 3.5-4 mm. longa, apicem versus pilis appressis albis e tuberculis minutis ortis pubescens ; superior lanceolata, acuminata, acuta, 5-6 mm. longa, prope margines plerumque sparse pubescens, ceterum glabra, minutissime scaberula. *Anthoecium inferum* ♂ : lemma spiculae aequilongum, lanceolatum, acuminatum, setaceo-acutum, tenuiter chartaceum, 3-nerve, glabrum, minutissime scaberulum ; palea oblonga, truncata, 3 mm. longa, carinis brevissime ciliatis. *Anthoecium superum* anguste oblongum : callus rotundato-obtusum, 0.3 mm. longus, pilis usque 1 mm. longis dense barbatus ; lemma teres, marginibus involutum, 3 mm. longum, brevissime et acute bilobum, tenuiter 7-nerve, minute et appresse pubescens ; arista geniculata, scaberula, 7-8 mm. longa, columna 3.5-4 mm. longa aurea, seta pallida ; palea anguste oblonga, lemmati aequilonga. *Antherae* 2, usque 2 mm. longa, brunnea.

NIGERIA : Ondo Province and District ; Idanre, summit of Carter's Peak, in tufts in crevices of flat granite top, Nov. 20, 1946, R. W. J. Keay & C. F. Onochie in *Forest Herbarium, Ibadan* 21563.

In this new representative of the section *Pseudotristachya*, the unequally pedicelled spikelets are borne usually in triads at the tips of the branches and branchlets, but occasionally one of a triad may be imperfect or even not developed.

Loudetia baldwinii C. E. Hubbard, sp. nov. ; a *L. capillipede* C. E. Hubbard, culmis plurinodibus, foliorum laminis latioribus, rhachi et ramis glabris vel fere glabris, spiculis minoribus, glumis latioribus, gluma superiore 5-nervi, lemmate infero 7-8-nervi, arista brevior distiguenda.

Gramen perenne, laxe caespitosum, circiter 65 cm. altum. *Culmi* erecti vel adscendentes, gracillimi, teretes, usque 1 mm. diametro, basin versus ramosi, ramis erectis, plurinodes, nodis minute villosulis vel pubescentibus, ceterum glabri, laeves. *Foliorum vaginae* tenuiter striatae, minute scaberulae, inferiores et intermediae internodiis longiores, pilis patulis demum deciduis laxe pilosae, superiores internodiis breviores, arcte appressae, glabrae vel sparse pubescentes ; ligulae ad seriem ciliorum brevium redactae ; laminae lineares, in acumen tenuissimum attenuatae, usque 13 cm. longae, 2.5-3.5 mm. latae, planae, firmae, oblique patentes, laxe vel sparse pilosae vel pubescentes vel glabrescentes, minute scaberulae, virides. *Panicula* laxa, anguste ovata vel oblonga, 8-13 cm. longa, 2-4 cm. lata, cinereo-brunnea ; rhachis gracillima, flexuosa, nodis pubescens, ceterum glabra vel fere glabra ; rami capillares, 2-6-nati, erecti vel adscendentes, flexuosi, simplices vel sparse ramosi, minute scaberuli, apicibus exceptis hirsutis glabri, inferiores usque 7.5 cm. longi ; ramorum et ramulorum apices demum recurvati ; pedicelli inaequales, 0.5-2 mm. longi, ut ramorum ramulorumque apices pilis patulis usque 2 mm. longis albis plerumque e tuberculis minutis ortis laxe hirsuti. *Spiculae* apicibus ramorum et ramulorum per triades fasciculatae, 4-5 mm. longae, hiantes, brunneae. *Glumae* tenuiter

chartaceae, acuminatae, acutae, superne et margines versus pilis albis patulis usque 2-3 mm. longis e tuberculis minutis ortis laxe hirsutae, minutissime scaberulae; inferior anguste ovata, 3-3.5 mm. longa, 3-nervis; superior late lanceolata vel ovata, spiculae aequilonga, 5-nervis, nervibus lateralibus approximatis. *Anthoecium inferum* ♂: lemma ovatum, acutum, gluma superiore paullo brevius vel ei aequilongum, tenuiter chartaceum, 7-8-nerve, glabrum vel apicem versus pubescens, minutissime scaberulum; palea oblonga, obtusa, 3 mm. longa, membranacea, carinis scabrido-ciliolatis. *Anthoecium superum* elliptico-oblongum: callus obtusus, usque 0.3 mm. longus, breviter barbatus; lemma 2.5-3 mm. longum, acute bilobum (lobis 3-nervibus usque 0.5 mm. longis, membranaceum, tenuissime 9-nerve, minute et appresse pubescens; arista geniculata, 3.5-4 mm. longa, columna nulla, seta viridi vel purpurea scaberula; palea anguste oblonga, lemmati aequilonga. *Antherae* 3, 1.5-2 mm. longae.

FRENCH GUINEA: Macenta, frequent on open rock hill, 660-830 m., October 14-15, 1947, *J. T. Baldwin Jr.* 9757.

With the addition of the two new species *L. baldwinii* and *L. villosipes*, the section *Pseudotristachya* now comprises seven species, all from west tropical Africa. *L. baldwinii* resembles *L. capillipes* C. E. Hubbard in the structure of its inflorescence and in the development of hairs on the tips of the branches and branchlets, on the pedicels and the glumes, but in other respects it presents an entirely different appearance. It differs from all other species of the section in being triandrous and not diandrous, in the awn being without a column, and with the exception of *L. trigemina* C. E. Hubbard, in possessing a 5-nerved upper glume and a 7-nerved lower lemma.

Loudetia tisserantii C. E. Hubbard, sp. nov.; a *L. coarctata* (A. Camus) C. E. Hubbard, habitu annuo, foliorum laminis brevioribus, spiculis paullo longioribus, gluma inferiore anguste lanceolata setaceo-acuta spiculae aequilonga vel ea paullo brevior, lemmate infero gluma superiore brevior, anthoecii superi callo truncato differt.

Gramen annuum, caespitosum, 30-60 cm. altum. *Culmi* erecti, graciliusculi, teretes, simplices vel e nodis inferioribus ramosi, 2-3-nodes, internodio inferiore brevi et intermedio elongato, glabri, laeves. *Foliorum vaginae* internodiis multo breviores (basalibus exceptis), teretes, firmae, arcte appressae, glabrae, laeves; ligulae ad seriem ciliorum brevissimorum redactae; laminae angustissime lineares, setaceae, acutae, 5-12 cm. longae, involutae et 0.5-1 mm. diametro vel explanatae usque 2 mm. latae, erectae, rigidulae, subtus glabrae et laeves, supra arcte nervatae et dense scaberulae. *Panicula* spiciformis, densa, 2.5-5 cm. longa et 10-12 mm. lata (aristis exclusis), flavida; rhachis gracilis, glabra, laevis; rami appressi, usque 3 mm. longi, 2-1-spiculati, laeves; pedicelli laterales brevissimi, laeves. *Spiculae* appressae, imbricatae, lineari-lanceolatae, acuminatae, 12.5-14 mm. longae. *Glumae* 3-nerves, aequales vel paullo inaequales; inferior anguste lanceolata, longe acuminata, setaceo-acuta, 11-14 mm. longa, dorso rotundata, membranaceo-chartacea, nervis pilis patentibus usque 3 mm. longis albis e tuberculis minutis castaneo-brunneis ortis laxe setosa, minutissime

pubescens ; superior oblongo-lanceolata, acuminata, apice rotundato-truncata vel demum minute bifida, 12·5–14 mm. longa, membranaceo-chartacea, circa medium secus et prope nervos pilis brevibus e tuberculis minutissimis brunneis ortis hispidula, apicem versus scaberula. *Anthoecium inferum* ♂ : lemma lanceolatum, acuminatum, acutum vel minute emarginatum, 9–10 mm. longum, 3-nerve, membranaceo-chartaceum, glabrum ; palea anguste oblonga, obtusa, 6·7–5 mm. longa, carinis angustissime alatis apicem versus minute scaberulis. *Anthoecium superum* anguste oblongum : callus anguste linearis, truncatus, 1·5 mm. longus, dense ciliolatus, apice pilis albis usque 2 mm. longis dense barbatus ; lemma marginibus involutum, 5·5–5 mm. longum, apice brevissime et acute bilobum, tenuiter coriaceum, 7-nerve, appresse pubescens ; arista leviter geniculata, 5·5–6 cm. longa, columna aurea circiter 2 mm. longa minute scaberula, seta pallida ; palea linearis, lemmati aequilonga. *Antherae* 2, 1·7–2 mm. longae, purpureae. *Ovarium* glabrum.

FRENCH EQUATORIAL AFRICA : Oubangui-Chari ; Ouaka (Waka) District, at the foot of gneiss rocks at Keyorede, 20 km. south of Ippy, October 8th 1928, *C. Tisserant* 2713 (Herb. G. Le Testu).

Although compared with *L. coarctata* in the diagnosis, it does not appear to be closely related to this or any other known species of the subsection *Densiflorae*. In fact, the glumes so far as their structure and relative lengths are concerned, are more like those of some species of *Tristachya*, from which genus *Loudetia tisserantii* differs only in the usually binate arrangement of the spikelets.

Tristachya glabrinodis *C. E. Hubbard*, sp. nov. ; affinis *T. kerstingii* (Pilger) *C. E. Hubbard*, sed nodis glabris, inflorescentiae ramis pedicellis et glumis esetosis et plerumque etuberculatis differt.

Gramen annuum, 40–60 cm. altum. *Culmi* laxe fasciculati, erecti, graciles, teretes, 1·5–2 mm. diametro, simplices vel ramosi, ramis erectis solitariis vel 2–3-natis, 2–3-nodes, primo pruinosi (praecipue nodos versus), glabri, laeves. *Foliorum vaginae* internodiis breviores, teretes, arcte appressae, tenuiter striatae, laeves, inferiores ore pilis paucis e tuberculis ortis praeditae, ceterum glabrae ; ligulae ad seriem densam ciliorum minorum redactae ; laminae anguste lineares vel subsetaceae, tenuiter acutae, plus minusve erectae, planae vel convolutae, usque 10 cm. longae et 3 mm. latae, supra nervatae, marginibus pilis paucis e tuberculis ortis praeditae, ceterum glabrae, laeves vel fere laeves. *Panícula* erecta vel leviter secunda, contracta, 4–9 cm. longa (aristis exclusis), 4–10 triades spicularum gerens ; rhachis superne scaberula ; rami erecti vel adscendentes, usque 2 cm. longi, filiformes, bini vel solitarii, simplices, glabri, scaberuli ; pedicelli 2–2·5 mm. longi, intus minutissime puberuli. *Spiculae* anguste oblongo-lanceolatae, 13–15 mm. longae, pallidae et apicem versus flavido-tinctae. *Glumae* glabrae, firme chartaceae, 3-nerves ; inferior lanceolata, obtusa, 8–10 mm. longa, nervis minute scaberula et tuberculis paucis brunneis rarissime praedita, ceterum laevis ; superior lineari-lanceolata, truncata, spiculam aequans, laevis. *Anthoecium inferum* sterile : lemma lineari-lanceolatum, truncatum, 10–11 mm. longum, 3-nerve, glabrum, laeve ; palea lanceolato-linearis, breviter biloba, 7–9 mm. longa, membranacea, carinis anguste alatis, alis superne minute ciliolatis. *Anthoecium superum* anguste

oblongum : lemma 4.5 mm. longum, apice lobis acutis 1 mm. longis 1-nerviis bilobum, crustaceo-coriaceum, tenuiter 7-nerve, appresse pubescens ; arista 5.5-8 cm. longa, columno brunneo hispidulo 2.3-3.5 cm. longo, seta pallida curvata scabrida ; palea lineari-lanceolata, truncata, 5 mm. longa, carinis prominentibus ; antherae 2, 1.5 mm. longae ; ovarium glabrum ; caryopsis oblonga, 3 mm. longa.

GOLD COAST : Northern Territories ; Lawra, *J. Hinds* 3806, 3853 (Type).

Closely related to *T. kerstingii* Pilger, C. E. Hubbard. This species has also been collected at Lawra by Mr. Hinds (no. 3821) and may be readily distinguished by the ring of stiff spreading yellowish hairs from a projecting rim at the upper nodes and especially by the spreading golden bristle-like hairs arising from brown tubercles which are such a conspicuous feature of the ramifications of the inflorescence and of the glumes. It is possible that *T. glabrinodis* hybridizes with *T. kerstingii* since in some material of the former the lower glume has been found bearing a few brown tubercles on the nerves.

ARISTIDEAE

Aristida angolensis C. E. Hubbard, sp. nov. ; affinis *A. vanderystii* De Wild., sed foliorum basaliium vaginis estriatis laevibus vel fere laevibus, paniculae ramis laevibus vel superne leviter scaberulis, glumis subaequalibus vel paullo inaequalibus, lemmatibus columna carentibus differt.

Gramen perenne, dense caespitosum, circiter 90 cm. altum. *Culmi* erecti, 2 mm. diametro, simplices, rigidi, basin versus paucinodes, tenuiter striati, glabri, laeves, internodio summo e vagina longe exserto. *Foliorum vaginae* imbricatae, arcte appressae, teretes, basales persistentes, latae, bases culmorum dense obtegentes, estriatae, glabrae, vel ore pilosae, laeves, vel apicem versus minute scaberulae, superiores tenuiter striatae, superne scaberulae : ligulae ad seriem densissimam ciliorum redactae ; laminae anguste lineares, in acumen durum acutum attenuatae, usque 20 cm. longae, convolutae vel inferne explanatae et usque 2 mm. latae, rigidiusculae, dense et minutissime hispidulae. *Panícula* erecta, angusta, laxè contracta, usque 40 cm. longa (aristis inclusis), paucispiculati ; rhachis striata, laevis ; rami bini vel solitarii, erecti, appressi, basin versus nudati, superne simplices vel sparse divisi, 1-pauci-spiculati, angulares, laeves vel superne leviter scaberuli, inferiores usque 10 cm. longi ; pedicelli laeves, laterales 3-8 mm. longi, terminales elongati. *Spiculae* pallide brunneae. *Glumae* anguste lineari-lanceolatae, tenuiter acutae, glabrae, subaequales vel paullo inaequales et inferior superiore longior ; inferior 2.5-3.2 cm. longa, 5-nervis ; superior usque 2.5 cm. longa, 3-nervis. *Lemma* lineare, demum convolutum, superne leviter angustum, 15-17 mm. longum (callo excluso), glabrum, laeve, sine columna ; callus tenuiter acutus, 3.5-4 mm. longus, dense et breviter barbatus ; aristae 3, cum lemmate continuatae, curvatae et patentes, scabridae, subaequales, 7.5-10 cm. longae. *Palea* oblonga, 2.5 mm. longa. *Lodiculae* 3 mm. longae. *Caryopsis* linearis, 9 mm. longa, atro-brunnea.

ANGOLA : Benguella ; country of the Ganguellas and Ambuellas, *Gossweiler* 4099A.

This species is very similar to *A. vanderystii* De Wild., but may be distinguished by the smooth or nearly smooth estriate basal leaf-sheaths, the smooth or nearly smooth ramifications of the panicle, less unequal glumes, and especially in the absence of a column to the awns. Gossweiler's specimen was one of several referred to *A. vanderystii* by Henrard in his monograph of *Aristida* (Meded. Herb. Leid. no. 58A, 215), and probably accounts for the statement that the column is not developed in immature spikelets. I have examined a number of young spikelets of *A. vanderystii* and other species of *Aristida* and in all cases the column commences to develop before the lower part of the lemma, whereas in the specimen forming the basis for *A. angolensis* the lemma is well developed and moreover the florets contain almost mature caryopses.

ISACHNEAE

Isachne scandens C. E. Hubbard, sp. nov. ; ab *I. angolensi* Rendle, culmis scandentibus altioribus gracilioribus, foliorum vaginis internodiis multo brevioribus apicem versus hispidulis, laminis supra plerumque scaberrimis subtus pubescentibus, ramis et pedicellis patentibus hic illic glandibus annularibus praeditis, lemmatibus dense et minute pubescentibus differt.

Gramen perenne, scandens, usque 90 vel 120 cm. altum. *Culmi* ascendentes, gracillimi, teretes, usque 0.8 mm. diametro, rigidiusculi, multinodes, laxe ramosi, pilis patentibus minutis demum deciduis e papillis minutissimis ortis sparse hispiduli, vel scaberuli vel fere laeves et glabri, internodiis usque 12 cm. longis. *Folia* glauco-viridia ; vaginae internodiis demum multo breviores, arcte appressae, teretes, tenuiter striatae, superne pilis patentibus densiuscule hispidulae vel tandem glabrescentes, marginibus ciliolatae, ceterum laeves ; ligulae ad seriem ciliorum 1.5–2 mm. longorum redactae ; laminae lanceolato-lineares vel anguste lanceolatae, basi leviter contractae, apice acutae, 2.5–6 cm. longae, 2.5–5.5 mm. latae, planae, patentēs vel tandem reflexae, tenuissime nerves, nervis supra densissime scabridae, vel minute hispidulae, vel minutissime papillosae, subtus pilis brevissimis appressis e papillis minutissimis ortis densiuscule pubescentes, marginibus scaberulae. *Panicula* ovata vel oblonga, 4–8 cm. longa, 2–4 cm. lata, laxa ; rhachis minute scaberula ; rami gracillimi, angulares, solitarii, flexuosi, laxe divisi, minute scaberuli vel fere laeves, glandibus annularibus cylindricis flavidis minimis hic illic praediti, inferiores usque 4 cm. longi ; pedicelli patentēs, 2–4.5 mm. longi, fere laeves, ut ramis glanduliferi. *Spiculae* a dorso visae oblongo-ellipticae vel ellipticae, a latere visae late ellipticae vel tandem obovatae, obtusae, 1.5–1.6 mm. longae, flavido-virides. *Glumae* marginibus hyalinis exceptis herbaceo-membranaceae, convexae, tenuissime 5–7-nerves, dorso pilis minutissimis paucis obscure pubescentes, vel glabrescentes ; inferior explanata late elliptica, obtusa vel subacuta, circiter 1.5 mm. longa ; superior explanata latissime elliptica, obtusa, inferiore aequilonga vel paullo brevior. *Anthoecium inferum* ♂, a dorso visum ellipticum vel oblongo-ellipticum obtusum, a latere visum semi-ellipticum : lemma circiter 1.3 mm. longum, tenue coriaceum, obscure 5-nerve, pilis minutis patentibus densissime pubescens ; palea lemma aequans, dorso margines versus leviter pubescens ; antherae 0.6 mm. longae. *Anthoecium superum* ♀, infero simile sed paullo brevius : lemma et palea eis anthoecii inferi similia sed paullo breviora.

NORTHERN RHODESIA: Mwinilunga District; in swamp at edge of evergreen vegetation by River Dobeka north of Dobeka Bridge, among scattered shrubs and ferns; perennial, scrambling up shrubs to 3 or 4 ft.; Nov. 8, 1937, *Milne-Redhead* 3163.

The genus *Isachne* is represented in tropical Africa by about seven species, four of which, including *I. scandens*, belong to sect. *Eu-Isachne* Honda, in which the lemmas and paleas are very similar in shape, size and texture, and the two florets are almost contiguous, being separated only by a very short rhachilla internode. By its scrambling wiry culms, narrow leaf-blades and smaller less diffuse panicles, *I. scandens* may be readily distinguished from *I. buettneri* Hack. and *I. aethiopica* Stapf et Hubbard, two of the three previously recorded African species of the above section. The third, *I. angolensis* Rendle, may be separated by its more contracted panicles with the branchlets and pedicels more or less appressed to the branches, by the glumes being shorter than the florets, and especially by the glabrous or nearly glabrous and slightly larger lemmas. The cylindrical zones of yellowish glandular tissue occurring here and there on the ramifications of the panicle are also a characteristic feature of *Isachne kiyalaensis* Robyns, a species of sect. *Para-Isachne* Honda, in which the florets are dissimilar. They have also been seen in a few specimens of *I. aethiopica*, but have not been observed in any other African species.

PANICEAE

Panicum gemmeum C. E. Hubbard, sp. nov.; *P. hystri* Steud. valde affine, sed laminis brevioribus, panicula brevior et laxior, spiculis paullo majoribus, anthoecio supero elliptico majore, lemmate supero dorso longitudinaliter striato verruculis subglobosis minutis numerosis praedito differt.

Gramen annum, laxiuscule caespitosum, 10–25 cm. altum. *Culmi* erecti vel geniculato-adscendentes, gracillimi, teretes, usque 1 mm. diametro, 3–6-nodes, ramosi, ramulis erectis paniculas gerentibus, glabri, laeves. *Folia* viridia; vaginae tenuiter striatae, glabrae, laeves, inferiores internodiis paullo longiores vel subaequales, superiores eis demum breviores; ligulae truncatae, usque 0.5 mm. longae, membranaceae, glabrae; laminae lineares, acutae, 1–5 cm. longae, 1.5–3 mm. latae, planae, oblique erectae, pilis patulis debilibus sparse pilosae, vel glabrescentes, supra nervis tenuissimis plus minusve scaberulae, ceterum laeves. *Panicula* erecta, ovata, laxissima, aperta, 2–5 cm. longa, usque 5 cm. lata; axis primarius filiformis, glaber, laevis, superne flexuosus; rami capillares, demum horizontaliter patentes, solitarii, laxi divisi, ramulis patulis 3 l-spiculatis, flexuosi, glabri, laeves, inferiores usque 3 cm. longi et 6–17 mm. distantes; pedicelli inaequales, 2–8 mm. longi, laeves, apice minute discoidei. *Spiculae* a latere visae late ellipticae vel late ovato-ellipticae, primo acutae, demum obtusae, 1.7–2 mm. longae, densiuscule pubescentes, plerumque pallide virides. *Glumae* concavae, herbaceo-membranaceae, pilis patulis brevibus rigidiusculis e tuberculis minutis ortis pubescentes; inferior explanata late ovata, acuta, gluma superiore paullo brevior, 3–5-nervis; superior explanata elliptica, acuta, spiculae aequilonga, 5-nervis. *Anthoecium inferum* ♂: lemma explanatum latissime ellipticum, obtusum, gluma superiore simile sed hyalino-membranaceum et fere glabrum; palea elliptica, lemmati fere aequi-

longa, carinis laevibus; antherae 1.2 mm. longae. *Anthoecium superum* a dorso visum ellipticum, acutum, 1.2–1.3 mm. longum, basi truncatum, demum cinereo-fuscum, facile deciduum; lemma tenuissime longitudinaliter striatum, verruculis subglobosis minutis nitentibus sub lentem conspicuis numerosis praeditum, crustaceum; palea ut lemma verruculosa. *Caryopsis* late elliptica, 0.9 mm. longa.

NIGERIA: Ondo Province; Akure Division, Idanre, Carter's Peak, c. 480 m., locally common in a drying-up seepage place on granite rock, Jan. 1, 1948, *J. P. M. Brenan & R. W. J. Keay* 8658.

The section *Verruculosae* Stapf, to which *Panicum gemmeum* belongs, is particularly well-developed in west tropical Africa in the region extending from Senegal, French Guinea and Sierra Leone eastwards to Nigeria. All the species are characterised by the presence of minute or microscopic wart-like outgrowths of various shapes on the outer surfaces of the upper lemma and palea. In *P. hystrix* Steud., with which our new species has been compared, these outgrowths are relatively few and exceedingly small, whereas those of *P. gemmeum* are rather numerous, subglobose, and in the mature floret quite conspicuous under the lens ($\times 20$). The fertile florets of the two species differ also in size, those of *P. gemmeum* having about twice the bulk of those of *P. hystrix*, which in the latter range from 0.8–1 mm. in length.

Setaria gracilipes *C. E. Hubbard*, sp. nov.; affinis *S. bongaënsi* (Pilger) Mez, sed panicula majore, spiculis anguste oblongis paullo longioribus, lemmate superiore anguste oblongo obtuso fere laevi differt.

Gramen annuum, laxae caespitosum, usque 60 cm. altum. *Culmi* erecti vel e basi geniculata adscendentes et e nodis inferioribus nonnunquam radicanter, gracillimi, siccitate plus minusve compressi, 0.6–1.3 mm. lati, simplices vel inferne ramosi, 3–6-nodes, basin versus purpurei, nodos et paniculam versus puberuli, ceterum glabri laevesque, internodio supremo (pedunculo) filiformi. *Foliorum vaginae* nodis dense pubescentes, tenuissime striatae, inferiores plerumque purpureae, compressae, carinatae, internodiis longiores vel demum paullo breviores, pilis deflexis minutis dense pubescentes, marginibus ciliolatae, superiores virides, internodiis breviores, glabrescentes vel glabrae, laeves, leviter carinatae vel summae teretes; ligulae ad seriem densam ciliorum brevium redactae; laminae anguste lanceolatae, tenuiter acutae, 5–10 cm. longae, 4–9 mm. latae, planae vel basi leviter plicatae, inferiores in pseudo-petiolum filiformem usque 3 cm. longum et superiores in basin angustam gradatim attenuatae, flaccidae, virides, supra pilis laxissime dispositis pilosae, subtus minute pubescentes vel glabrescentes, nervis et marginibus minute scaberulae, costa media tenuissima, nervis lateralibus 6–8. *Inflorescentia* paniculata, flexuosa, linearis vel anguste lanceolata, 7–18 cm. longa, 0.5–3 cm. lata, contracta vel aperta, inferne interrupta, viridis; axis primarius minute scaberulus vel superne minute hispidulus; rami erecti et appressi vel oblique patentes, inferiores 2–4 cm. longi et 2–4 cm. distantes, superiores gradatim breviores, flexuosi, tenuiter filiformes, dense et minute hispiduli vel dense scabridi, simplices et racemiformes vel basin versus ramulos breves gerentes, spiculis contiguis vel imbricatis cum vel sine seta fulciente; setae tenuissimae, flexuosae, minute scaberulae, 5–9 mm. longae; pedicelli apice discoidei, laterales brevissimi,

Spiculae appressae, anguste oblongae, acutae, apiculatae, dorso compressae, 2.5–3 mm. longae, virides, laeves. *Glumae* inaequales; inferior oblongo-obolata, rotundato-obtusa, 0.8–1 mm. longa, hyalino-membranacea, 3–5-nervis; superior explanata ovato-oblonga, acuta, apiculata, spiculae fere aequilonga, tenuiter membranacea, 7-nervis. *Anthoecium inferum* sterile: lemma explanatum late oblongum, obtusum, apiculatum, spiculam aequans, dorso conspicue et anguste sulcatum vel concavum, tenuiter membranaceum, 7-nerve; palea anguste oblonga, obtusa, lemmati aequilonga, hyalina, carinis anguste alatis. *Anthoecium superum* infero paullo brevius, anguste oblongum, acutum: lemma apice papilloso-asperulo excepto laeve, tenuiter coriaceum; palea laevis. *Antherae* 1 mm. longae.

NIGERIA: Ogoja Province; Ikom District, British Ogbokum, side of stream just under main waterfall, in sands, May 8, 1946, *A. P. D. Jones* and *C. F. Onochie* in *Forest Herbarium, Ibadan* 18878.

A very graceful species of the section *Ptychophyllum*, closely resembling *S. thollonii* (Franch.) Stapf and *S. bongaënsis* (Pilger) Mez of the Cameroons, French, Belgian and Portuguese Congo, but distinguished from both by its slightly longer and relatively narrower oblong spikelets and by the almost smooth (not transversely rugulose) upper lemma, and from the former by the slender pseudopetioles of the lower leaf-blades.

The combination *Setaria bongaënsis* Mez (*Panicum bongaënsis* Pilger) was published by Mez in *Mildbraed, Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped.* 1910 11, 2: Bot. 20 (1922), some years earlier than that by A. Camus (1927, given in the *Flora of Tropical Africa* (9: 861, 1930).

Thyridachne C. E. Hubbard. Genus novum, a *Sacciolepede* Nash, spiculis dorso compressis, gluma inferiore rotundato-obolata enervi circiter quartam partem spiculae aequanti, gluma superiore tenuissime 5-nervi dorso coriacea explanata apice lata leviter et obtuse biloba vel triloba, lemmate anthoecii inferi coriaceo incrassato rigido tenuissime 3-nervi apice lato leviter et obtuse trilobo in dorso angustissime sulcato (sulco tenuissimo facile scisso), lodiculis nullis distinguendum.

Spiculae a dorso visae late lanceolatae vel ovatae, a latere visae asymetricae, late semi-lanceolatae vel semi-ovatae, muticae, subacutae, dorso compressae, plano-convexae, abaxiales, contiguae vel leviter imbricatae, in ramis erectis brevibus paucispiculatis paniculae spiciformis cylindricae pedicellatae, demum totae a pedicellis persistentibus disarticulantes. *Anthoecia* duo: inferum ♂ vel sterile; superum ♀, infero brevius. *Glumae* valde dissimiles; inferior lata, oblata, rotundata, basin spiculae amplexans, usque quartam partem spiculae aequans, tenuiter membranacea, enervis; superior spiculae aequilonga, dorso convexa, marginibus incurvis spiculae apicem amplexantibus, explanata elliptico-oblonga, apice lata obtuse biloba vel leviter triloba, tenuissime 5-nervis, glabra, laevissima, apice membranaceo excepto coriacea. *Anthoecium inferum*: lemma glumae superiori fere aequilongum, dorso fere planum, siccitate ovatum et obtusum, explanatum oblongum vel obovato-oblongum, apice latum leviter et obtuse trilobum, in dorso angustissime sulcatum, sulco basi in areolam vel fenestram translucentem dilatato,

rigidum, incrassatum, nitens, marginibus angustissimis apice lato et in sulco membranaceis exceptis coriaceum, tenuissime et obscure 3-nerve; palea lemmati aequilonga vel eo paullo brevior, anguste truncata vel bidentata, membranacea, hyalina, tenuiter 2-nervis vel enervis. *Anthoecium superum* dorso valde compressum, plano-convexum, a dorso visum ovatum et acutum: lemma explanatum late ovatum et obtusum, apice membranaceo excepto tenuiter coriaceum, 3-nerve, marginibus angustissimis inflexis firmis; palea lemma aequans, obtusa, dorso plana, 2-nervis, tenuiter coriacea. *Lodiculae* nullae. *Stamina* 3; antherae oblongae. *Ovarium* glabrum; styli liberi, elongati, terminales; stigmata plumosa, ex apice anthocicii exserta. *Caryopsis* dorso valde compressa, plano-convexa vel concavo-convexa, ambitu late elliptica vel orbicularis, inter lemma et palea inclusa; hilum late ellipticum, subbasale; scutellum ellipticum, circiter dimidiam partem caryopseos aequans.—*Gramen* annum; laminae lineares; ligulae firme membranaceae; inflorescentia stricta, gracilis.

Species unica, Africae tropicae centralis incola.

Thyridachne tisserantii C. E. Hubbard, species nova.

Gramen aquaticum, 1 m. altum. *Culmi* erecti vel basi geniculati, validiusculi, teretes, usque 4 mm. diametro, spongiosi, circiter 4-nodes, e nodis inferioribus radicales, ramosi, ramis erectis, glabri, laeves, internodio summo gracillimo elongato e vagina longe exserto. *Folia* glabra; vaginae latiusculae, marginibus scariosis exceptis spongiosae, laeves, nitentes, apice auriculis erectis ligulae adnatis auriculatae, inferiores internodiis longiores, intermediae et superiores eis breviores; ligulae truncatae, 1.2–2.5 mm. longae, glabrae; laminae lineares, obtusae, erectae, rigidiusculae, inferne spongiosae, subtus glabrae et laeves, supra dense pubescentes, siccitate arcte convolutae, explanatae usque 5 mm. latae, inferiores usque 22 cm. longae, summae rigidae, 0.5–1.5 cm. longae. *Inflorescentia* densa, continua, 10–16 cm. longa, 2.5–3.5 mm. diametro; rhachis flexuosa, ut ramis glabra et laevis; rami 3–6 mm. longi, usque 6-spiculati; pedicelli plerumque curvati, 1–3 mm. longi, apice discoidei. *Spiculae* 3–3.2 mm. longae, pallidae vel apice purpureo-suffusae. *Glumae* glabrae, laeves; inferior 0.5–0.7 mm. longa. *Anthoecium inferum*: lemma dorso apicem versus seriebus duabus ciliarum setiformium appressarum exceptis glabrum; palea glabra, laevis; antherae 1.6–2 mm. longae. *Anthoecium superum*: lemma et palea glabra et laevis; antherae 1.3 mm. longae; caryopsis 1–1.5 mm. longa, pallide brunnea.

FRENCH EQUATORIAL AFRICA: Ubangi-Chari; Ouaka (Waka) District, source of the Pagita, 45 km. east of Moroubas, in pool on laterite, Nov. 13, 1924, C. Tisserant 1712 (Herb. G. le Testu).

The tropical regions of Africa and America are rather rich in genera of the *Panicaceae* exhibiting structural modifications of the glumes and lemmas in an otherwise relatively simple type of spikelet. These modifications, often brought about by lateral or dorsal pressure, or due to the persistence of favourable adaptations of use for dispersal or protection of the seed, are consequently of great value for purposes of classification and generic distinction. There are, however, certain features which are, with few

exceptions, characteristic of the whole tribe. Thus the glumes, and lemmas of the male or barren lower florets, are normally membranous contrasting with the indurated lemma and palea of the fertile upper floret. *Thyridachne* is one of the exceptions to this rule, departing from the typically panicoid type of structure, in that the upper glume and lower lemma are thickened and hardened, serving with the slightly less indurated upper lemma and palea as an additional means of protection for the seed. It is in this respect that our new genus differs so markedly from its close ally *Sacciolepis* Nash. Distinctions in the nervation of the glumes and lower lemma are also very noticeable, for whilst the nerves in *Sacciolepis* are usually numerous and prominent, producing a ribbed effect in the upper glume and lower lemma, those in *Thyridachne* are fewer and so very fine and obscure that the corresponding scales are quite smooth. Other differences between the two genera are to be found in the shape of the spikelets and in the development of the glumes. For example, in *Sacciolepis* the spikelets are either laterally compressed or terete, the lower glume is usually relatively well developed, lanceolate to ovate or elliptic, one-third to three-fourths the length of the spikelets and 3-9-nerved, and the upper glume is usually saccate at the base and, like the lower lemma, 5-13- (mostly 7-9-) nerved. On the other hand, the spikelets of *Thyridachne* are dorsally compressed, the lower glume is very short and nerveless, and the upper glume evenly curved on the back.

The name *Thyridachne* is given on account of the window-like zone of thin translucent tissue at the base of the lower lemma.

Paratheria glaberrima C. E. Hubbard, sp. nov. ; affinis *P. prostrata* Griseb., sed nodis glabris, inflorescentiae ramis et setis laevissimis, setis plerumque brevioribus, spiculis 10-12 mm. longis basi glabris, glumis ovatis plus minusve acutis paullo longioribus differt.

Gramen perenne, usque 30 cm. altum. *Culmi* e basi prostrata longe repente ascendentes, graciles, teretes, laxè ramosi, multinodes, glabri, laeves. *Foliorum vaginæ* internodiis demum breviores, prope laminam carinatae, tenuiter striatae, laeves, ore pilis minutis paucis praeditae, ceterum glabrae ; ligulae truncatae, brevissimae, obscure et minutissime ciliolatae ; laminae lineares, acutae, usque 15 cm. longae et 4 mm. latae, planae, glabrae, laeves. *Racemæ* stricti, erecti, laxè spiculati, usque 12 cm. longi ; rhachis laevis ; rami 12-16 mm. longi (parte rhachis adnata usque 7 mm. longa inclusa), laeves ; pedicelli 1.5 mm. longi, glabri ; setae rigidae, triquetrae, glabrae, laeves, 15-23 mm. longae. *Spiculae* anguste lanceolatae, acuminatae, acutae, 10-12 mm. longae, glabrae, pallidae. *Glumae* anguste ovatae vel ovatae, acutae vel subacutae, hyalinae, enerves, laeves ; inferior 1.7-2 mm. longa ; superior 2-2.5 mm. longa. *Anthoecium inferum* : lemma spicula paullo brevius, anguste lanceolatum, acuminatum, acutum, membranaceum, glabrum, laeve, 9-nerve ; palea nulla. *Anthoecium superum* : lemma spiculam aequans, lemmati infero simile sed 7-nerve ; palea anguste lanceolata, acuminata, acuta, lemma aequans ; antherae 4 mm. longae.

SIERRA LEONE : Kambia District ; Luti, Great Scarcies River, edge of tidal rice swamp, especially common at base of main bund of new empolder, forming mats 3-4 ft. across, July 19, 1946, *Deighton* 4337.

A few solitary axillary cleistogenes are present at the bases of and enclosed in the leaf-sheaths, especially in the lower part of the culms. These cleistogenes are about 12 mm. long and similar in structure to the spikelets of the terminal inflorescence, except for the glumes which are slightly larger. The caryopsis in these cleistogamous spikelets is about 5 mm. long, and at its tip are to be found the remains of three anthers 0.8–1 mm. long.

Paratheria prostrata may be readily distinguished from this new species by its densely bearded nodes, usually hairy leaves, coarsely scabrid bristles, and the shorter oblate and truncate or rotundate glumes, whilst the bristles are relatively longer compared with the length of the spikelets, the former ranging from 2.4 cm. and the latter from 6–10 (rarely 12) mm. long.

ANDROPOGONEAE

Urelytrum stapfianum C. E. Hubbard, sp. nov. ; ab *U. giganteo* Pilger, foliorum laminis angustioribus usque 14 mm. latis, racemis 8–10 validioribus, spiculis longioribus differt.

Gramen perenne, altitudine 1.9 m. superans. *Culmi* erecti, validi, teretes, usque 7 mm. diametro, simplices, plus quam 3-nodes, glabri, laeves, internodio summo elongato tenuiter striato. *Foliorum vaginæ* elongatae, latae, teretes, internodiis longiores, arcute appressae, firmae, striatae, ore barbatae, vel omnino glabrae, laeves vel fere laeves ; ligulae truncatae, usque 3 mm. longae, scariosae, glabrae ; laminae lineares, in apicem tenuissimum flexuosum gradatim et longissime attenuatae, usque 1 m. longae et 14 mm. latae, planae vel siccitate marginibus involutae, firmissimae, glabrae, supra prominenter nervatae, minute scaberulae vel marginibus scaberrimis exceptis fere laeves, costa media supra plana flavida usque 2.5 mm. lata subtus convexa. *Inflorescentia* circiter 40 cm. longa. *Racemi* 8–10, stricti vel flexuosi, erecti, usque 25 cm. longi, 2–3 mm. lati, solitarii vel nonnunquam oppositi, purpurei, pedunculati ; axis primarius usque 12.5 cm. longus ; pedunculi stricti, 2–7 cm. longi, superne minute scaberuli, basi leviter pilosi ; rhacheos internodia plerumque 9–11-(14) mm. longa, a dorso visa lineari-oblonga vel linearia, a latere visa superne incrassata, facie leviter concava, dorso nervata scaberula convexa, basi brevissime barbata, uno margine scabrida, oblique disarticulanti, apice appendiculata, appendice angusta inaequaliter dentata minute ciliolata rigida usque 1 mm. longa ; pedicelli anguste oblongi, apice truncato-emarginati, dorso compressi, 5–7 mm. longi, internodiis rhacheos multo breviores. *Spiculae sessiles* anguste ovatae vel anguste ovato-oblongae vel anguste elliptico-oblongae, obtusae, 6–7-(9) mm. longae (callo incluso) ; callus obovatus, obtusus, 1–2 mm. longus, basi minute barbatus. *Glumae* aequales ; inferior dorso plana, coriacea, 6–7-nervis, nervis 2–3 intracarinalibus apicem versus prominentibus, carinis et nervis apicem versus spinuloso-scabrida, ceterum laevis et glabra ; superior navicularis, acuta, chartacea, 3-nervis, carina apicem versus spinuloso-ciliolata, marginibus hyalinis ciliolata. *Anthoecium inferum* : lemma glumis paullo brevius, ovato-oblongum, obtusum, tenuiter membranaceum, 2-nerve, marginibus hyalinis ciliolatis exceptis glabrum ; palea oblongo-lanceolata, 2-nervis, nervis superne scaberula, glabra. *Anthoecium superum* : lemma eo anthoecii inferi paullo brevius,

elliptico-oblongum, infra medium firme membranaceum, 3-nerve, marginibus minute ciliolata; palea oblongo-lanceolata, 2-nervis, glabra. *Lodiculae* oblongae, truncatae. *Antherae* 3-4 mm. longae, purpureae. *Spiculae pedicellatae* oblongae vel anguste ovato-oblongae, 4-6 mm. longae, spiculis sessilibus plus minusve similes sed anthoeciis masculis. *Glumae* eis spiculae sessilis similes sed inferior aristata, arista 8-20 mm. longa flexuosa vel curvata scabrida.

ANGOLA: Malange district, Gossweiler 800 (Type); Malange Plateau, Kela, near the River Lui, 1000 m., Jan. 3, 1931, Gossweiler 9518.

In the spikelets of Gossweiler 9518, the florets are diseased and the spikelets up to 9 mm. and the internodes of the rhachis (up to 14 mm.) longer than in Gossweiler 800; in other respects the two gatherings are similar.

In the Flora of Tropical Africa (vol. 9, p. 46, 1917), due to the absence of authentic material of *Urelytrum giganteum* Pilger, Gossweiler 800 was referred incorrectly to that species. Examination of the type of Pilger's species, kindly lent for study by the Director of the Berlin Herbarium, showed that it represented the same species as the later described *U. thyrsoides* Stapf (1917).

Urelytrum muricatum C. E. Hubbard, sp. nov.; ab *U. squarroso* Hack., culmis validioribus altioribus, ligulis truncatis brevioribus ciliolatis, laminis latioribus supra spinuloso-scabridis, racemis plerumque 2-4-natis, carinis glumae inferioris plerumque conspicue muricatis differt.

Gramen perenne, caespitosum, 1.2-2.1 m. altum; innovationes intravaginales. *Culmi* erecti, validi, teretes, usque 5 mm. diametro, simplices, paucinodes, glabri, laeves, internodio supremo elongato e vagina exserto. *Foliorum vaginae* elongatae, internodiis longiores vel paullo breviores, teretes, ore barbatae, ceterum glabrae, inferiores persistentes, laevissimae, superiores tenuiter striatae, laeves; ligulae truncatae, 1-2 mm. longae, scariosae, minute ciliolatae; laminae anguste lineares, in acumen tenuissimum gradatim attenuatae, usque 90 cm. longae, planae vel siccitate convolutae, usque 7 mm. latae, glabrae, supra prominenter nerves, nervis et marginibus spinuloso-scabridae, subtus tenuissimae nerves scaberulae vel laeves, costa media supra plana usque 1 mm. lata flavida subtus convexa. *Racemi* plerumque 2-4-nati, vel solitarii, stricti, erecti, usque 26 cm. longi, 3-3.5 mm. lati, viriduli; axis primarius usque 3 cm. longus; pedunculi 1-4 cm. longi, basi barbati; rhacheos internodia a dorso visa oblonga, a latere visa superne incrassata, 9-11 mm. longa, facie leviter concava, dorso plus minusve convexa viridi-nervia glabra et laevia vel brevissime pubescentia, basi pilis usque 2 mm. longis dense sericeo-barbata, oblique disarticulanti, apice appendiculata, appendice oblique cupulariformi irregulariter dentata rigide chartacea 2.5-4 mm. longa; pedicelli oblongi, internodiis paullo breviores, dorso compressi, apice bidentati vel bilobi, uno margine ciliolata. *Spiculae sessiles* anguste oblongo-lanceolatae vel anguste ovatae, raro ovatae vel oblongae, acutae vel obtusae, 7-10 mm. longae (callo incluso); callus rotundato-obtusius, latus, 1-1.5 mm. longus, pilis usque 1.5 mm. longis barbatus. *Glumae* aequales: inferior dorso plana vel leviter convexa, rigidissima, corneo-coriacea, plerumque 5-nervis, nervo uno intracarinali

apicem versus prominente, dorso pilis appressis brevissimis dense pubescens, vel glabrescens vel raro glabra, carinis plerumque conspicue muricata apicem versus spinuloso-ciliolata; superior navicularis, acuta, 3-nervis, scarioso-chartacea, carinis superne anguste alatis spinuloso-ciliolata, marginibus hyalinis molliter ciliolata. *Anthoecium inferum*: lemma oblongum, obtusum, glumis paullo brevius, tenuiter membranaceum, hyalinum, 2-nerve, marginibus ciliolatum; palea anguste oblonga vel anguste lanceolata, acuta, 2-nervis, nervis minute scabro-ciliolata. *Anthoecium superum*: lemma ovato-oblongum, obtusum, mucronulatum, eo anthoecii inferi subaequilongum, tenuiter membranaceum, hyalinum, 3-nerve, marginibus minute ciliolatum; palea anguste lanceolata, 2-nervis, glabra. *Lodiculae* late oblongae, oblique truncatae. *Antherae* 2.5–5 mm. longae. *Spiculae pedicellatae* plus minusve lanceolatae, 7–8.5 mm. longae, masculae vel raro steriles et ad glumas usque 2 mm. longas redactae. *Gluma inferior* dorso glabra vel pubescens, 5-nervis, uno carina spinuloso-ciliolata, in aristam flexuosam vel curvatam vel falcatam scabridam basin versus applanatam usque 8 cm. longam gradatim attenuata; gluma superior carina superne anguste alata spinuloso-ciliolata. *Lemmata* et paleae eis spiculae sessilis similia. *Antherae* 3–4 mm. longae.

NORTHERN NIGERIA: Zaria Province, Samaru, 600 m., in orchard bush, August 19, 1948, *Thatcher* S.466; *ibid.*, in uncultivated bush land, Sept. 1946, *Ibadan Dept. Agric.* no. Sept. 46-Samaru-21 (Type); *ibid.*, Shika, in bush land lying fallow for many years, Sept. 19, 1946, *Ibadan Dept. Agric.* no. Sept. 46-Shika-P.H.49; Plateau Province, Naraguta Forest Reserve, Jos, common, Dec. 1943, *Kennedy* (33) in *Forest Herb. Ibadan* 1157; Bauchi Plateau, in savannah, Sept. 1930, *Lely* 759; Niger Province, Kuta Division, near Gwada, near a stream, uncommon, 1942, *Lamb* in *Forest Herb. Ibadan* 3192.

Vern. names: *Rumaya* or *Rumiya*.

The lower glume of the sessile spikelets is typically rather densely and shortly pubescent on the back, but the hairs being deciduous, often at an early stage, cause the glume to present a glabrous appearance. This glume is also somewhat variable in shape, but much of the variation described is due to the inclusion of *Lely* 759, in which it is broader and slightly shorter, and moreover only slightly muricate on the keels. In all examples the lower glume is very rigid and thickened, probably more so than in any other species of the genus. Except for *Kennedy* 33, the pedicelled spikelets are always well developed and enclose two male florets, but in this gathering they are much reduced in size and completely sterile. In other respects both *Lely*'s and *Kennedy*'s specimens agree with the remainder of the specimens cited above.

Urelytrum auriculatum *C. E. Hubbard*, sp. nov.; ab *U. squarroso* Hack., culmis ramosis, ligulis elongatis usque 16 mm. longis, racemis terminalibus 2–3-natis vel apice ramorum solitariis, carina glumae inferioris infra medium plerumque laevibus, spiculis pedicellatis sterilibus ad glumas et lemmata brevia redactas distinguendum.

Gramen perenne, dense caespitosum, usque 1.5 m. altum; innovationes intravaginales. *Culmi* erecti, basi leviter incrassati, validiusculi, teretes vel superne uno latere sulcati, usque 4 mm. diametro, rigidi, 4–6-nodes,

circa medium ramosi, ramis gracillimis erectis racemos solitarios gerentibus, nodis leviter tumidi, glabri, laeves, internodiis inferioribus brevibus, internodio summo usque 50 cm. longo e vagina longe exserto. *Foliorum vaginæ* teretes, firmæ, apice longe auriculatæ, auriculis erectis angustis ligulæ adnatis, inferiores internodiis longiores, basales subpersistentes, demum in fibras fissæ, superiores internodiis breviores ; ligulæ angustæ, scariosæ, 7-16 mm. longæ, fissæ ; laminæ anguste lineares, in acumen flexuosum gracillimum gradatim attenuatæ, usque 70 cm. longæ, planæ vel marginibus revolutæ, 2.5-5 mm. latæ, rigidulæ, subtus glaucae nervis asperulis tenuissime nervis, supra virides prominenter striatæ, glabræ, marginibus et supra nervis præcipue margines versus spinuloso-scabridæ, costa media supra plana usque 0.8 mm. lata flavida subtus convexa. *Racemi* apice culmorum primariorum 2-3-nati, vel solitarii ramos terminantes, erecti, stricti vel leviter curvati, 10-15 cm. longi, 2.5-3 mm. lati, purpurei ; axis primarius usque 1 cm. longus ; pedunculi 1-3 cm. longi, laeves, basi breviter barbati ; rhacheos internodia a dorso visa anguste oblonga, a latere visa superne incrassata, facie concava, dorso convexa nitentia nervata laevia, uno margine scaberula, 9-11 mm. longa, basi pilis usque 3 mm. longis sericeo-barbata, apice appendiculata, appendice oblique cupulariformi 2.5-3.5 mm. longa chartacea irregulariter dentata vel lobata minutissime ciliolata ; pedicelli lineari-oblongi, apice emarginati, dorso compressi laeves, internodiis paullo breviores vel æquilongi. *Spiculæ sessiles* lanceolato-oblongæ, anguste elliptico-oblongæ vel lanceolatae, subobtusæ vel acutæ, 8-11 mm. longæ (callo incluso) ; callus rotundato-obtusum, latus, 1-1.5 mm. longus, pilis usque 1 mm. longis barbatus. *Glumæ* æquales ; inferior dorso leviter convexa vel plana, coriacea, nitens, 5-nervis, nervo uno intracarinali apicem versus prominente, carinis circiter medium leviter spinuloso-muricata vel laevis et apicem versus spinuloso-ciliolata, ceterum glabra et laevis ; superior navicularis, acuta, scariosa, 3-nervis, carina apicem versus spinuloso-ciliolata, marginibus hyalinis molliter ciliolata. *Anthoecium inferum* : lemma oblongum, obtusum, glumis paullo brevius, tenuiter membranaceum, hyalinum, 2-nervis, marginibus ciliolatum ; palea lanceolato-oblonga, acuta, 2-nervis, glabra. *Anthoecium superum* : lemma ovato-oblongum, acutum, mucronatum, eo anthoecii inferi paullo brevius, membranaceum, 3-nervis, marginibus ciliolatum ; palea lanceolato-oblonga, obtusa, 2-nervis, glabra. *Antheræ* 4 mm. longæ. *Spiculæ pedicellatæ* steriles, ad glumas et lemmata hyalina usque 1 mm. longa redactæ ; gluma inferior in aristam flexuosam vel falcatam basin versus applanatam scabridam 6.5-10 cm. longam attenuata ; gluma superior circiter 4 mm. longa, carina spinuloso-ciliolata.

NORTHERN NIGERIA : Plateau Province ; Vodni, Pankshin Division, open plains and savannah bush, on laterite soils, 1932, *Saunders* 36, 36A (Type).

Vern. name : *Ande* (Fulani, Pankshin).

Urelytrum gracilius C. E. Hubbard, sp. nov. ; affine *U. squarroso* Hack., sed ligulis brevioribus, racemis subcylindricis gracilioribus, spiculis sessilibus brevioribus anguste oblongis vel lanceolato-oblongis, carinis glumæ inferioris emuricatis, spiculis pedicellatis sterilibus ad glumas 1 mm. longas redactis differt.

Gramen perenne, circiter 90 cm. altum. *Culmus* erectus, graciliusculus, teres, simplex, 3-nodis, basin versus 3 mm. diametro, glaber, laevis, internodio supremo gracili elongato. *Foliorum vaginae* internodiis longiores, elongatae, persistentes, teretes, tenuiter striatae, ore pilosae, ceterum glabrae, laeves; ligulae rotundatae, circiter 1 mm. longae, scariosae, minute ciliolatae; laminae anguste lineares, in acumen tenuissimum attenuatae, usque 40 cm. longae, 3 mm. latae, planae, firmae, virides, supra prominenter nervatae, nervis et marginibus scabridae, subtus laeves, glabrae. *Racemus* solitarius, gracilis, 20 cm. longus, subcylindricus, 1.7 mm. diametro, erectus, strictus, pallide purpureo-tinctus, pubescens; rhacheos internodia 10 mm. longa, a dorso visa lineari-oblonga, a latere visa linearia apicem versus incrassata, facie leviter concava, dorso convexa paucinervia minute pubescentia, basi pilis 1-2 mm. longis albis barbata, apice appendiculata, appendice 2-3 mm. longa cupulariformi chartacea minute ciliolata inaequaliter dentata; pedicelli lineari-oblongi, apice truncati et appendice minuta biloba praediti, internodiis fere aequilongi, dorso compressi, minute pubescentes. *Spiculae sessiles* anguste oblongae vel lanceolato-oblongae, subobtusae, 6-7 mm. longae (callo incluso); callus rotundato-obtusus, latus, 1 mm. longus, pilis usque 1 mm. longis barbatus. *Glumae* aequales; inferior dorso leviter convexa, coriacea, 3-nervis, nervo uno intracarinali apicem versus leviter prominente, carinis supra medium spinuloso-ciliolata, dorso pilis appressis minutis dense pubescens; superior navicularis, chartaceo-scariosa, 3-nervis, carina apicem versus spinuloso-ciliolata, marginibus hyalinis angustis molliter ciliolata. *Anthoecium inferum*: lemma glumis paullo brevius, oblongum, obtusum, tenuissime membranaceum, hyalinum, 2-nerve, marginibus ciliolatum; palea oblongo-lanceolata, 2-nervis, carinis superne scaberula. *Anthoecium superum*: lemma oblongum, obtusum, eo anthoecii inferi paullo brevius, membranaceum, hyalinum, 3-nerve, marginibus apicem versus minutissime ciliolata; palea anguste oblonga, 2-nervis, glabra. *Spiculae pedicellatae* steriles, ad glumas 1 mm. longas redactae; gluma inferior in aristam scabridam usque 6 cm. longam flexuosam vel curvatam basin versus applanatam attenuata.

NORTHERN NIGERIA: Shika District, near Zaria, 1944, *Bumfus* 29.

***Urelytrum fasciculatum* Stapf**, sp. nov., ms., nunc a C. E. Hubbard describitur. Affine *U. stapfiano* C. E. Hubbard, sed culmis gracilioribus, laminis angustioribus, racemis 4-6 longe pedunculatis, gluma inferiore spiculae sessilis 3-nervi, spiculis pedicellatis sterilibus ad glumas 1-1.5 mm. longas redactis, aristis longioribus differt.

Gramen perenne, dense caespitosum, usque 1.9 m. altum; innovationes intravaginales. *Culmi* erecti, validiusculi, teretes, basin versus 5 mm. diametro, simplices, 3-nodes, glabri, laeves. *Foliorum vaginae* internodiis longiores, teretes, elongatae, arcte appressae, ore plerumque barbato excepto glabrae, apice auriculatae, auriculis obtusis 1-2 mm. longis, basales persistentes, usque 30 cm. longae, nitentes, latiusculae, laevissimae, superiores tenuiter striatae; ligulae truncatae, 1-1.5 mm. longae, scariosae, minute ciliolatae; laminae lineares, basin versus angustatae, in apicem gracillimum tenuiter acutum gradatim attenuatae, usque 80 cm. longae, 3-5 mm. latae, planae vel siccitate marginibus revolutae,

erectae, rigidae, sparse pilosae vel glabrae, marginibus et superne scaberrimae, supra striatae, costa media supra plana flavida usque 1 mm. lata. *Racemi* 4-6, longe pedunculati, usque 25 cm. longi, 2-3 mm. lati, graciliusculi, stricti vel leviter curvati, purpureo-suffusi, bini vel solitarii, secus axem primum 3-5 cm. longum orti; pedunculi gracillimi, usque 6 cm. longi, basi dense sericeo-barbati, laeves; rhacheos internodia 5-7 mm. longa, a dorso visa oblonga, a latere visa superne incrassata, facie leviter concava, dorso convexa minutissime asperula, uno margine minute scaberula, oblique disarticulanti, basi annulo pilorum alborum usque 1 mm. longorum dense sericeo-barbata, apice appendiculata, appendice oblique cupulariformi inaequaliter dentata vel lobata minutissime ciliolata 1-1.5 mm. longa; pedicelli anguste oblongi, dorso compressi, internodiis fere aequilongi, apice truncato-emarginati et minute ciliolati. *Spiculae sessiles* anguste ovato-oblongae vel anguste ovato-ellipticae, acuminatae, apice obtusae, 6-6.5 cm. longae (callo incluso); callus 0.5-0.8 mm. longus, rotundato-obtusus, breviter barbatus. *Glumae* subaequales; inferior dorso plana, coriacea, 3-nervis, carinis supra medium minute spinuloso-ciliolata, ceterum glabra, laevis; superior navicularis, subacuta, chartaceo-scariosa, 3-nervis, carina apicem versus spinuloso-ciliolata, marginibus hyalinis molliter ciliolata. *Anthoecium inferum*: lemma oblongum, glumis fere aequilongum, tenuiter membranaceum, hyalinum, tenuissime 2-nerve, dorso minute et appresse pubescens, marginibus ciliolatum; palea lemma aequans, anguste oblonga, obtusa, hyalina, tenuissime 2-nervis, glabra. *Anthoecium superum*: lemma eo anthoecii inferi paullo brevius, oblongum, acutum, hyalinum, tenuissime 3-nerve, apicem versus minutissime pubescens, marginibus ciliolatum; palea oblonga, obtusa, lemmate brevior, tenuissime 2-nervis, glabra. *Lodiculae* obcuneatae, truncatae. *Antherae* 2.8-3.5 mm. longae. *Spiculae pedicellatae* steriles, 1-1.5 mm. longae, ad glumas redactae; gluma inferior in aristam falcata patulam scabridam usque 4 cm. longam producta; gluma superior ovato-oblonga, carina minute spinuloso-ciliolata.

CAMEROONS: without precise locality, *Mildbraed* 10284 (Comm. A. H. Unwin, December 1916).

Andropogon sylvaticus C. E. Hubbard, sp. nov., ab *A. pseudoschinzii* Stapf, vaginis pilosis, ligulis auriculis et aristis brevioribus, laminis latioribus, internodiis rhacheos et pedicellis pilis longioribus ciliatis, spiculis longioribus differt.

Gramen perenne, caespitosum, 1-1.3 m. altum; innovationes extra-vaginales; gemmae et bases culmorum cataphyllis latis brevibus coriaceis striatis inter strias appresse pubescentibus ceterum glabris obiectae. *Culmi* erecti, graciliusculi, teretes, usque 2 mm. diametro, rigidi, 8-9-nodes, inferne simplices, superne sparse ramosi, glabri, laeves, internodio supremo (pedunculo) gracillimo. *Foliorum vaginae* internodiis longiores, plerumque arcte appressae, teretes, firmae, pilis mollibus laxe pilosae, vel inferiores glabrescentes, apice auriculatae, auriculis erectis angustis usque 3 mm. longis ligulis adnatis; ligulae emarginatae, usque 3 mm. longae, firme membranaceae; laminae anguste lineares, basi angustae, in acumen tenuissimum longe attenuatae, usque 35 cm. longae et 6 mm. latae, planae vel siccitate convolutae, sparse pilosae vel glabrescentes, supra nervosae, nervis minutissime hispidae vel scaberulae,

marginibus scabridae, costa media gracillima. *Racemi* bini, circiter 8 cm. longi, graciliusculi, stricti vel leviter curvati, purpurascens, villosi, alter sessilis, alter base gracillima 8-10 mm. longa leviter pubescente vel puberula fultus; internodia rhacheos et pedicelli aequales vel fere aequales, 5-6 mm. longi, lineari-obcuneati, pilis albis usque 3 mm. longis dense ciliati, apice oblique cupulati et emarginati vel minute dentati. *Spiculae sessiles* a latere valde compressae, a fronte visae lineares, 7.5-8 mm. longae; callus brevissimus, pilis usque 1.5 mm. longis dense barbatus. *Glumae* subaequales; inferior a dorso visa lineari-lanceolata, apice angustata, explanata oblonga et apice emarginata vel minute bidentata, dorso profunde canaliculata, praeter carinas 4-6-nerves coriaceas enervis et translucens, carinis superne setuloso-ciliata, inferne glabra et laevis; superior navicularis, supra medium carinata, explanata ovata et obtusa vel minutissime biloba, scariosa, marginibus ciliolata, carina apicem versus scabrida, ceterum glabra, 3-nervis, apice aristata, arista stricta vel flexuosa tenuissima usque 5 mm. longa. *Anthoecium inferum*: lemma lanceolato-oblongum, obtusum, glumis paullo brevius, tenuiter membranaceum, hyalinum, 2-nerve, marginibus ciliolatum. *Anthoecium superum*: lemma eo anthoecii inferi fere aequilongum, ovato-oblongum, acute bilobum, tenuiter membranaceum, hyalinum, 3-5-nerve, marginibus ciliolatum, aristatum; arista usque 15 mm. longa, minute scaberula, geniculata, columna usque 6 mm. longa. *Spiculae pedicellatae* elliptico-oblongae, acutae, 7-8 mm. longae, dorso compressae. *Gluma inferior* chartacea, 13-17-nervis, carinis setuloso-ciliata, dorso praecipue margines et apicem versus scaberula, apice aristata, arista stricta vel curvata tenuissima minute scaberula usque 5 mm. longa; gluma superior elliptico-ovata, 3-5-nervis, membranacea, marginibus ciliolata, apice breviter aristata (arista usque 3 mm. longa) vel mucronata vel mutica. *Lemmata* oblonga, acuta, tenuiter membranacea, hyalina, mutica, marginibus ciliolata; inferum 2-3-nerve; superum 3-5-nerve. *Antherae* 3 mm. longae.

NYASALAND: Zomba District; Zomba Plateau, common perennial clump grass of *Brachystegia* woodlands, 1430 m., May 30, 1946, Brass 16098.

Andropogon thomasii C. E. Hubbard, sp. nov.; ab *A. flabellifero* Pilger (*A. purpureo* Stapf), spiculis sessilibus latioribus lanceolato- vel elliptico-oblongis, gluma inferiore coriacea dorso plerumque complanata intra carinas 5-6-nervi, spiculis pedicellatis brevioribus, gluma inferiore 13-15-nervi differt.

Gramen perenne, compacte caespitosum, 45-50 cm. altum, e rhizomate brevi ortum; innovationes intravaginales. *Culmi* erecti, graciliusculi, compressi, rigidi, 2-3-nodes, nodo supremo e vagina exserto, simplices vel e nodo intermedio ramosi, ramis solitariis erectis, inflorescentiam versus villosi et prope nodos pilis paucis nonnunquam pilosi, ceterum glabri, laeves. *Foliorum vaginae* valde plicato-compressae, carinatae, tenuiter striatae, marginibus apicem versus et ore plus minusve villosae, ceterum sparse pilosae vel glabrescentes vel glabrae, laeves, basales persistentes, circa basin culmi dense imbricatae, flabellatae, usque 14 cm. longae et a latere visae 6 mm. latae; ligulae ad seriem densam ciliorum brevium redactae; laminae lineares, acutae, usque 20 cm. longae,

conduplicatae, carinatae, explanatae 4-8 mm. latae, erectae, rigidiusculae, rubidae, marginibus et carina scaberrulae, glabrae. *Racemi* 3-5, 4-8 cm. longi, rubidi, dense spiculati, stricti vel leviter curvati; axis primarius usque 3 cm. longus, pilosus; internodia rhacheos linearia, circiter 3 mm. longa, complanata, apice truncata, pilis usque 1.5 mm. longis dense ciliata, dorso glabra; pedicelli internodiis similes sed graciliores. *Spiculae sessiles* lanceolato-vel elliptico-oblongae, acuminatae, 6-7 mm. longae; callus brevissimus, pilis albis usque 1 mm. longis dense barbatus. *Glumae* aequales; inferior apice minute bidentata vel acuta, dorso plana vel inferne late et leviter concava, coriacea, 9-11-nervis (nervibus intracarinalibus 5-7 inferne evanescentibus), carinis exalatis supra medium scaberrula, ceterum glabra, laevis; superior navicularis, carinata, explanata elliptico-oblonga, acuminata, carina scaberrula, apice mucronata, firme chartacea, marginibus membranaceis ciliolatis exceptis glabra. *Anthoecium inferum*: lemma oblongum, circiter 6-6.5 mm. longum, basin versus 2-3-nerve, marginibus ciliolatum. *Anthoecium superum* ♀: lemma lineari-oblongum, 5 mm. longum, usque medium bilobum, lobis angustis acutis hyalinis ciliolatis; arista geniculata, 7-10 mm. longa, minute scaberrula, columna 4-5 mm. longa, seta horizontaliter patenti; palea nulla; antherae 4 mm. longae; lodiculae late oblongo-cuneatae, oblique truncatae. *Spiculae pedicellatae* lanceolato-oblongae vel lanceolatae, acutae, 6-7.5 mm. longae. *Gluma inferior* dorso plana, carinis superne scaberrula, coriacea, glabra, 13-15-nervis; gluma superior explanata elliptica, acuta, 3-nervis, carina superne scaberrula, marginibus latis hyalinis ciliolatis exceptis tenuiter coriacea et glabra. *Lemma inferum* elliptico-oblongum, hyalinum, ciliolatum; antherae 4-5 mm. longae.

ANGLO-EGYPTIAN SUDAN: Imatong Mountains; Mt. Kineti, rocky summit, 3000 m., common tufted grass, Dec. 30, 1935, *Thomas* 1832.

Closely resembling *Andropogon flabellifer* Pilger of southern Tanganyika Territory mountains, particularly in the fan-like arrangement of the strongly compressed broad basal leaf-sheaths and in the tightly folded leaf-blades. The Tanganyika species has, however, narrower purplish sessile spikelets, with a thinner lower glume grooved down the middle of the back and 1-2-nerved in the groove.

Schizachyrium pratorum C. E. Hubbard, sp. nov.; a *S. compresso* (Stapf) Stapf, culmis gracilioribus inferne compressis, foliorum vaginis inferioribus plus minusve pilosis, laminis angustioribus, spiculis et aristis brevioribus distinguenda.

Gramen perenne, dense caespitosum, usque 80 cm. altum; caespites usque 30 cm. lati; innovationes intravaginales. *Culmi* erecti vel basi leviter geniculati, graciles, inferne compressi, superne teretes vel uno latere sulcati, rigidi, 4-6-nodes, ramosi, ramis 2-4-natis racemis terminatis, glabri, laeves, internodio summo (pedunculo) tenuiter filiformi e vagina demum longe exserto. *Foliorum vaginae* internodiis multo breviores, striatae, basales persistentes, compressae et carinatae, pilosae, superiores apice barbato excepto glabrae, laeves, subteretes; ligulae rotundato-obtusae, 0.8 mm. longae, membranaceae; laminae angustissime lineares, apice obtusae vel subacutae, inferiores usque 30 cm. longae, superiores eis breviores, conduplicatae vel inferne plus minusve convolutae, vel

explanatae et usque 3 mm. latae, rigidiusculae, inferne laxae vel densiuscule pilosae vel glabrae, laeves, supra striatae; spathae angustissimae, usque 4.5 cm. longae. *Racemi* graciles, pallide virides, 2.5–4.5 cm. longi, stricti vel leviter curvati; rhacheos internodia 3–4 mm. longa, superne anguste obcuneata, apice truncata et minute appendiculata, pilis albis usque 3 mm. longis ciliata; pedicelli internodiis similes sed leviter angustiores et subaequales vel paullo breviores. *Spiculae sessiles* lanceolatae vel elliptico-lanceolatae, 4.3–5 mm. longae; callus pilis albis usque 1 mm. longis barbatus. *Glumae* aequales; inferior lanceolata vel elliptico-lanceolata, obtusa vel minute bidentata, dorso fere plana, marginibus anguste inflexis, inter carinas prominenter 5-nervis, chartacea, dorso pilis paucis praedita vel glabra, carinis apicem versus minute scaberula, ceterum laevis; superior anguste elliptica, obtusa, membranacea, 3-nervis, ciliolata. *Anthoecium inferum*: lemma oblongum, emarginato-truncatum, 3.5–4 mm. longum, hyalinum, tenuissime 2-nerve, ciliolatum. *Anthoecium superum*: lemma oblanceolato-oblongum, apice breviter bilobum, 3.5–4 mm. longum, hyalinum, tenuissime 3-nerve, ciliolatum; arista geniculata, 7–10 mm. longa, columna flavida 2–3.5 mm. longa; palea nulla; antherae 2–3 mm. longae. *Spiculae pedicellatae* sessilibus subsimiles sed 4.5–5.5 mm. longae, anguste lanceolatae, acutae, glabrae; lemma superum anguste elliptico-lanceolatum, minute bidentatum; antherae 1.6 mm. longae.

SIERRA LEONE: Karene District; Batkanu, in grassfield dominated by *Rhytachne rotthoellioides*, flooded during rains, Feb. 20, 1946, Deighton 4187.

Monocymbium deightonii C. E. Hubbard, sp. nov.; *M. lanceolato* C. E. Hubbard affine, sed culmis gracilioribus, foliorum laminis brevioribus et angustioribus, spatheolis et racemis brevioribus, spiculis dorso glabris, gluma inferiore 9–10-nervi differt.

Gramen perenne, 30–120 cm. altum. *Culmi* gracillimi, teretes, 0.5–1.7 mm. diametro, e basi elongata procumbente multinodi plerumque geniculato-ascendentes et e nodis inferioribus radicales, rigidi, multinodes, internodiis 1.5–7 cm. longis, superne laxae ramosi vel ramosissimi, glabri, laeves. *Foliorum vaginae* internodiis breviores, teretes, tenuiter striatae, glabrae et laeves vel pilis albis patulis vel reflexis e tuberculis minutis ortis plus minusve hirsutae; ligulae rotundato-truncatae, brevissimae, membranaceae, glabrae; laminae anguste lanceolatae, in apicem acutum gradatim attenuatae, basi abrupte contractae, 1–5 cm. longae, 2–7 mm. latae, planae, oblique patentae, subtus glaucae, supra virides, glabrae, vel pilis albis laxae vel sparse pilosae, marginibus cartilagineis appresse setuloso-ciliolatae, ceterum laeves, costa media et nervis lateralibus (usque 8) tenuissimis. *Inflorescentia* angusta, laxissima, 8–30 cm. longa; axis primarius gracillimus, uno latere applanatus vel canaliculatus, angulatus, angulis ciliatus vel scaberulus; rami capillares, erecti, stricti vel apicem versus leviter curvati, scaberuli, pilis appressis plerumque pilosi, 3–7 cm. longi, plerumque simplices, solitarii vel 2–5-fasciculati; spatheolae anguste lanceolatae, tenuiter acutae, 1.5–2.7 cm. longae, a latere visae 1.5–2 mm. latae, chartaceae, rubro-brunneae, nervosae, plerumque glabrae, laeves. *Racemi* densi, 8–16 mm. longi, demum lateraliter exserti; pedunculi usque 8 mm. longi, apice pilosi; internodia rhacheos 1.3–1.8 mm. longa, breviter et dense

ciliata ; pedicelli internodiis similes. *Spiculae sessiles* anguste ellipticae vel elliptico-oblongae, obtusae, 3-3.7 mm. longae. *Gluma inferior* apice angustissima, truncata, coriacea, 9-10-nervis, dorso glabra laevis infra medium nitens flavida vel brunnea apicem versus nervata viridis, carinis supra medium setuloso-ciliolata vel ciliata ; gluma superior apice obtuse et minute biloba, chartacea, 3-nervis, dorso nitens, marginibus molliter ciliolata, carina apicem versus scabrida vel setuloso-ciliolata, inter lobos aristata, arista stricta tenuissima usque 2 mm. longa. *Anthoecium inferum* : lemma explanatum elliptico-oblongum, truncatum vel emarginatum, usque 3.4 mm. longum, hyalinum, enerve, ciliolatum. *Anthoecium superum* : lemma lineare, 2.5-2.8 mm. longum, usque medium acute et anguste bilobum, glabrum ; arista geniculata, 9-13 mm. longa, minutissime scaberula ; lodiculae obcuneatae, oblique truncatae ; antherae 1.5 mm. longae. *Spiculae pedicellatae* lanceolato-oblongae vel anguste ellipticae, acutae, 2.5-3.3 mm. longae, dorso glabrae et laeves, muticae, virides. *Gluma inferior* 10-nervis, dorso nitens, carinis apicem versus setuloso-ciliolata vel ciliata ; gluma superior 5-nervis, marginibus ciliolata ; antherae 1 mm. longae.

SIERRA LEONE : Sefadu, stony ground, granite outcrop on hill, in shade, Nov. 10, 1947, *Deighton* 4666 (Type) ; ibid., rocky places and granite outcrop, 420 m., common, Dec. 6, 1938, *Deighton* 3561.

FRENCH GUINEA : Macenta, on open rock hill, common, 600-750 m., October 14-15, 1947, *J. T. Baldwin Jr.* 9784.

This, the second new species to be based on material from Sierra Leone in the previously monotypic genus *Monocymbium*, is possibly even more decorative than the other two, the attractive reddish cymbiform spatheoles characteristic of the genus being associated with small lanceolate leaf-blades and mostly profusely branched very slender culms. The three species may be readily distinguished by the characters given in the following key.

Leaf-blades linear, 2-5 mm. wide, 5-15 cm. or more long ; culms caespitose, usually erect 1. *M. ceresiiforme*.

Leaf-blades narrowly lanceolate to lanceolate ; culms loose, usually geniculately ascending from a procumbent base and rooting at the nodes :

Leaf-blades lanceolate, 4.5-9 cm. long, 1-2 cm. wide ; culms 2.5-3 mm. in diameter ; spikelets usually more or less villose on the back 2. *M. lanceolatum*.

Leaf-blades narrowly lanceolate, 1-5 cm. long 2-7 mm. wide ; culms 0.5-1.7 mm. in diameter ; spikelets glabrous and shining on the back 3. *M. deightonii*.

1. ***Monocymbium ceresiiforme*** (Nees) Stapf in Prain, Fl. Trop. Afr. 9 : 387 (1919).

Andropogon ceresiaeformis Nees, Fl. Afr. Austr. 109 (1841). South Africa.

Distr. French Guinea eastwards to the Anglo-Egyptian Sudan, French and Belgian Congo, Tanganyika Territory to South Africa.

2. ***M. lanceolatum*** C. E. Hubbard in Kew Bull. 1936, 313 (1936).

Distr. Sierra Leone.

3. ***M. deightonii*** C. E. Hubbard, vide supra.

Urelytrum pallidum C. E. Hubbard, sp. nov. ; ab *U. fasciculato* Stapf ex C. E. Hubbard, racemis binatis vel solitariis subteretibus vel compressis pallidis, rhacheos internodiis viridi-nervatis, spiculis sessilibus paullo longioribus, carinis glumae inferioris scabridis, aristis spicularum pedicellatarum brevioribus usque 1.8 cm. longis differt.

Gramen perenne, caespitosum, 1-1.7 m. altum. *Culmi* erecti vel basi leviter geniculati, validiusculi, teretes, simplices, basin versus 3-4.5 mm. diametro, 3-nodes, prope nodos pruinosi, glabri, laeves. *Foliorum vaginae* internodiis longiores vel intermediae paullo breviores, elongatae, teretes, appressae, ore sparse piloso excepto glabrae, laeves, basales persistentes, usque 20 cm. longae ; ligulae rotundatae vel truncatae, 1-1.5 mm. longae, scariosae, glabrae ; laminae lineares, in apicem gracillimum tenuiter acutum scabridum gradatim attenuatae, usque 45 cm. longae, siccitate marginibus revolutae vel explanatae et usque 5 mm. latae, erectae, rigidae, supra striatae, marginibus et nonnunquam supra secus nervos spinuloso-scabridae vel scabridae, subtus laeves, costa media plana supra 0.8 mm. lata. *Racemi* 1-2, pedunculati, 15-23 cm. longi, 2-2.5 mm. lati, subteretes vel compressi, graciliusculi, stricti vel leviter curvati, pallidi ; pedunculi 3 cm. longi, graciles, laeves, basi barbati ; rhacheos internodia 6-8 mm. longa, a dorso visa oblonga et viridi-nervata convexa laevia glabra, a latere visa superne gradatim incrassata, facie concava, uno margine minutissime ciliata, oblique disarticulanti, basi pilis albis usque 1 mm. longis barbata, apice appendiculata, appendice oblique cupulariformi inaequaliter dentata et lobata minutissime ciliolata 1.5-2 mm. longa ; pedicelli lanceolato-oblongi, dorso plus minusve compressi, internodiis aequilongi, apice emarginati, uno margine minutissime ciliolati. *Spiculae sessiles* lanceolato-oblongae, anguste ovato-oblongae vel oblongae, apice subacutae, 7-8 mm. longae (callo incluso) ; callus truncatus, 0.8 mm. longus, brevissime barbatus. *Glumae* aequales ; inferior dorso plana, coriacea, 5-nervis, inter carinis binervatis 1-2-nervis, carinis supra medium scabrida, altero margine minute puberula, ceterum glabra et laevis ; superior navicularis, acuta, scarioso-membranacea, 3-nervis, carina apicem versus minute spinuloso-ciliolata, marginibus hyalinis molliter ciliolata. *Anthoecium inferum* glumis fere aequilongum : lemma explanatum oblongo-ovatum, obtusum, tenuiter membranaceum, hyalinum, 2-nerve, dorso sparse puberulum, marginibus ciliolatum ; palea lemma aequans, lanceolato-oblonga, obtusa, hyalina, 2-nervis, glabra. *Anthoecium superum* infero paullo brevius : lemma ovato-ellipticum, acutum, hyalinum, 3-nerve, marginibus ciliolatum ; palea lemmati brevior, lanceolato-oblonga, obtusa, hyalina, 2-nervis, glabra. *Antherae* 3-3.5 mm. longae. *Spiculae pedicellatae* steriles, 2 mm. longae, ad glumas redactae : gluma inferior in aristas leviter curvatam vel flexuosam scabridam 1.1-1.8 cm. longam producta ; gluma superior ovata, carina anguste alata minute spinuloso-scabrida.

GOLD COAST : Northern Territories ; Yendi Agricultural Station, 240 m., on poor sandy soil beneath Shea trees, as occasional solitary stands, with *Andropogon* and *Hyparrhenia* spp., August 1948, Hinds 6 (1948).

NOTES ON CYPERACEAE: XXI.*

An *Uncinia* from Marion Island.

E. NELMES.

The purpose of this note is to record the addition of a species of *Uncinia* to the Marion Island flora, which comprises fewer than a dozen known phanerogams. The sedge was collected by a Mr. Dyke, who is stationed on a weather ship near the island, which is situated about 960 miles to the south-east of the Cape of Good Hope (lat. 46° 52' S., long. 37° 45' E.). It is described below and named in honour of its discoverer.

Uncinia dykei appears to be more closely related to the Australasian *U. compacta* R. Br. than to any other species, but it differs strikingly in its extremely long glumes, which are up to twice as long as the utricles. In typical *U. compacta* the glumes and utricles are of about equal length. *U. moseleyana* Boeck., described from specimens collected on Kerguelen Island, in the south Indian Ocean, has glumes which are sometimes slightly longer than the utricles, but they are bright chestnut in colour, in contrast to the dull brownish-spadiceous glumes of *U. dykei*, and thus similar to those of *U. compacta*, to which species *U. moseleyana* has been reduced by Kükenthal (Engl. Pflanzenr. IV, 20 : 65 : 1909). The glumes of most of the other species of the genus are either shorter than their utricles or about equal to them.

As mentioned in Note XX, this Marion Island *Uncinia* is farther to the west than any other known species of the Australasian section, Sect. *Stenandra* C. B. Clarke, which may there have reached its westward limit, as the Tristan da Cunha species belong to the South American section, Sect. *Platyandra* C. B. Clarke.

***Uncinia dykei* Nelm.**, sp. nov. ; affinis *U. compactae* R. Br., sed glumis multo longioribus brunneo-spadiceis, utriculis utrinque nervosis, praecipue differt.

Caespitosa. *Rhizoma* curvato-elongatum, costatum, 1.25–1.5 mm. crassum, squamis vaginatis costatis fuscis demum emarcidis vestitum. *Culmus* solitarius, curvus, trigonus, circiter 20 cm. altus, foliatus et (praeter apicem, ubi fere 1 mm. crassus) in vaginis foliarum absconditus, costatus, sulcatus, laevis, basi in vaginis marcescentibus foliorum basilarinae vestitus. *Folia* curva, culmo breviora vel longiora, 2.5–4 mm. lata, plana vel conduplicata, valde nervosa, marginibus parce scabrida; *vaginae* ore brunneae et membranaceae, ceterum fusco-brunneae, nervis validis demum in fibras persistentes solutis. *Spica* solitaria, terminalis, androgynaecea, oblanceolata, 3–3.5 cm. longa, superne 7–9 mm. crassa, subdensiflora, parte mascula circiter 1 cm. longa et 4 mm. crassa; *bractea* subfoliacea sed tenuissima, spica sublongiora. *Glumae femineae* lanceolatae vel oblongo-lanceolatae, basi rigidae et incurvae, apice acutae vel obtusae, cymbiformes, 8–12 mm. longae, circiter 2 mm. latae, basi pallida excepta brunneo-spadiceae, marginibus angustissime albo-hyalinae, lateribus submembranaceae, dorso crassiores et valde trinerviae, nervo mediano apicem haud attingente. *Utriculi* (immaturi) lanceolati, compresso-plano-convexi, 5–6 mm. longi, 1.4–1.8 mm. lati, subcoriacei, valde

*Continued from K. B. 1949, 145.

plurinerves, glabri, anguste marginati, subpatuli, straminei, apice interdum fusco-brunnei, basi abrupte 1 mm. stipitati, superne sensim acuminati, apice subtruncati. *Achaenium* (immaturum) compressum, oblongo-ellipticum, 2.5–3 mm. longum, 1.25–1.5 mm. latum, vix rostratum. *Stylus* basi subincrassatus, in apice achenii persistens. *Stigmata* 3. *Rhachilla* os utriculi 4.5–5.5 mm. superans.

MARION ISLAND : Feb.–March 1948, *Dyke*.

NOTES ON CYPERACEAE: XXII.

Brass's New Guinea Carices.

E. NELMES.

Through the courtesy of the Director of the Arnold Arboretum I have been enabled to examine the *Carex* material collected by L. J. Bass in Papua (British New Guinea) (1933) and in Netherlands New Guinea (1938–39), and by Mr. & Mrs. Clemens in North-East (formerly German) New Guinea (1936–41). In due course I hope to see all the important collections of Malaysian *Carices*, in connection with the preparation of the account of *Carex* for the Flora Malesiana.

The present paper may be described as the first of a series of progress reports on the way to the publication of the larger work—a clearing of the ground in advance. In harmony with this definite purpose, only a limited and strictly relevant synonymy is given. The next of these preliminary contributions will deal with the Clemens collections.

It will be noted that my determinations do not always agree with those of Mr. S. T. Blake (Journ. Arn. Arb. 28 : 99–116 : 1947) nor with those of Dr. G. Kükenthal (Engl. Bot. Jahrb. 70 : 464–468 : 1940, and Bull. Jard. Bot. Buitenz. 16 : 315–321 : 1940). Blake was dealing with the Brass collections and Kükenthal mainly with those of Mr. & Mrs. Clemens. “Nelmes in Kew Bull.” refers to a Key to the Carices of Malaysia and Polynesia (Kew Bull. 1946 : 5–29 : 1946).

Carex rhizomatosa Steud. in Zoll. Verz. Ind. Archip., Heft. I, 60 : 1854 (nomen) et Synops. Pl. Glum. II, Cyper. 206 : 1855 ; Kükenth. in Bull. Jard. Bot. Buitenz. III, 16 : 316 : 1940 ; Nelmes in Kew Bull. 1946 : 17, 22 : 1946 ; S. T. Blake in Journ. Arn. Arb. 28 : 107 : 1947.

C. ? bukaënsis Palla in Rechinger, Bot. u. Zool. Ergebn. von den Samoa u. Salomonsinseln. 3 [500] (1913).

PAPUA : Central Division ; Mafulu, common amongst tall grass of deforested spurs, 1250 m., Sept.–Nov. 1933, *Brass* 5318.

Blake points out that the utricles of this gathering are almost smooth. This is true also of the Solomon Islands plants, apparently of this species, which were described as *C. bukaënsis* by Palla, and of specimens at the other end of the species range in India. The utricles of this species are typically sparsely hispidulous above.

C. lamprochlamys S. T. Blake in Journ. Arn. Arb. 28 : 104 : 1947 ; Nelves, l. c. 19, 23.

[*C. rafflesiana* var. *continua* (non (C. B. Clarke) Kükenth.)—Kükenth. l. c. 315.]

PAPUA : Central Division ; Mafulu, common erect ground plant in *Castanopsis* forest, 1250 m., Sept.–Nov. 1933, *Brass* 5323.

Clearly distinct from any hitherto described species of *Indocarex*, and without any obviously close allies.

Var. **diplocolea** Nelves, var. nov. ; a typo foliis supra apicem versus excepta laevibus, glumis femineis rubro-maculatis, utriculis interdum rubro-maculatis marginibus inferne hispidulis differt. —[*C. continua* (non C. B. Clarke).—S. T. Blake, l. c. 105.]

PAPUA : Utaqua Expedition to Mt. Carstensz, Camp VIa, 5 & 9 Jan. 1913, *Boden Kloss* type, Kew ; 4 km. south-west of Bernhard Camp, Idenburg River, rain-forest, one clump on river-bank, 850 m., March 1939, *Brass* 13211.

It was difficult to decide whether to treat this as a species, or as a variety either of *C. lamprochlamys* S. T. Blake or *C. papuana* Nelves. It differs from both in its smooth leaves, from the former also in the characters given in the diagnosis, and from the latter in its much broader (5–11 mm. leaves, more lanceolate and less obtuse glumes, among other minor differences. If and when more material is available, the relationships of the three plants may be more clearly seen.

C. continua C. B. Clarke, in my opinion, has not so far been found in New Guinea.

C. papuana Nelves, sp. nov. ; affinis *C. lamprochlamydi* S. T. Blake, sed foliis multo angustioribus, glumis fusco-rubris, utriculis haud pallidis, marginibus superne vitreo-hispidulis praecipue differt. —[*C. rafflesiana* var. *continua* (non (C. B. Clarke) Kükenth.)—Kükenth., l. c. ; 315–16.] [*C. continua* (non (C. B. Clarke).—S. T. Blake, l. c. 104–5.]

Caespitosa. Culmus trigenus, angulis subacutis, costatus, striatus, 64–68 cm. altus, laevis. Folia basilaria vel subbasilaria, longa sed culmo breviora, 3–6 mm. lata, revoluta, utraque pagina dense scabro-hispidula, rigida, costata ; vaginae rubro-vinaceae, dense minute hispidulae, demum fibrillosae. Inflorescentia composite interrupte paniculata, superiora 22–28 cm. culmorum occupans ; paniculae secundariae circiter 5, singulae, erectae, oblongo-ovatae vel oblongo-lanceolatae, 3–5 cm. longae, 2–3 cm. latae, subdensae, breviter vel longe pedunculatae ; pedunculi trigoni vel compressi, hispiduli, inferiores inferne laeves. Rhachis (praecipue angulis) hispidula. Bractae foliaceae, culmum aequantes vel superantes, breviter vel longe vaginantes, superiores minores. Spicae numerosae, androgynaeceae, 5–12 mm. longae, subdensiflorae, patentes, sessiles, parte mascula parti femineae plerumque aequilonga sed interdum ea breviora. Bracteolae glumiformes, parvae, aristatae ; arista longa vel longissima, saepe flexuosa, marginibus hispidula. Glumae femineae ovatae, apice obtusae, cymbiformes, 1.5–2 mm. longae, circiter 1 mm. latae, translucens, glabrae, nervosae, fusco-rubrae, superne marginibus late albo-hyalinae, vitta mediano trinervi nervis superne coalitis ex apice

excurrente ; *arista* hispidula, 0.25–1 mm. longa. *Utriculi* ellipsoidei, trigoni, faciebus planiusculi, circiter 4 mm. longi, circiter 1 mm. lati, submembranacei, dorso (facie abaxiali) valde 6–8-nerves, ventre (facie adaxiali) 3–4-nerves, glabri, laeves, marginibus superne vel apice interdum parce vitreo-hispiduli, anguste marginati, stricti vel leviter recurvati, demum patuli vel subpatentes, nitidi, stramineo-virides, interdum rubro-maculati, apice subsensim rostrati ; *rostrum* acuminatum, compressum vel plano-convexum, 1.5–2 mm. longum, anguste marginatum, marginibus parce vel subdense vitreo-hispidulum, marginibus exceptis plerumque rubidum, medio dorso sulcatum, bidentatum ; *os* vix obliquum ; *dentes* 0.2–0.3 mm. longi, stricti. *Achaenium* ellipsoideum, trigonum, 2 mm. longum, circiter 1 mm. latum, brunneum, angulis pallidum, abrupte rostratum ; *rostrum* leviter inflexum, circiter 0.2 mm. longum, apicem versus vix incrassatum. *Stylus* basi leviter incrassatus. *Stigmata* 3.

PAPUA : Central Division ; Mt. Tafa, common roadside species, also found occasionally on forest floor, 2400 m., May–Sept. 1933, *Brass* 5007.

Although Blake describes *C. lamprochlamys* as “ abundantly distinct ” from *Brass* 5007 (and from other numbers placed by him and Kükenthal under *C. continua*), I consider that the two species are very closely related to each other.

NETHERLANDS NEW GUINEA : 4 km. south-west of Bernhard Camp, Idenburg River, occasional tufts on open banks of rain-forest stream, 850 m., March 1939, *Brass* 13722.—Determined by Blake (l. c. 104–5) as *C. continua*.

This gathering is tentatively placed here until better material is available. It is certainly closely related to *C. papuana* and its allies.

The following plant may be a smooth-leaved form of *C. papuana*, but the material is too immature for certain determination. It was placed under *C. continua* by Blake (l. c. 104–5).

NETHERLANDS NEW GUINEA : 18 km. north-east of Lake Habbema, Bele River, *Fagaceae* forest, common in moist hollows, 2300 m., Nov. 1938, *Brass* 11225.

C. neo-guineënsis *C. B. Clarke* in Journ. Linn. Soc. Bot. 37 : 12 : 1904 ; Nelves, l. c. 19, 24 ; S. T. Blake, l. c. 105.

PAPUA : Central Division ; Mt. Albert Edward, small colony on an open grassland slope, 3600 m., May–July 1933, *Brass* 4391 ; Murray Pass, Wharton Range, common on grassland and recently burnt area, 2840 m., June–Sept. 1933, *Brass* 4623.—Both numbers determined by Kükenthal (l. c. 315–16) as *C. rafflesiana* var. *continua*.

NETHERLANDS NEW GUINEA : Lake Habbema, associated with *Sphagnum* and grasses in shrubby edges of forest, 3225 m., Aug. 1938, *Brass* 9210 ; 9 km. north-east of Lake Habbema, open stony bed of stream in forest, 2750 m., Oct. 1938, *Brass* 10560 ; 9 km. north-east of Lake Habbema, few (mostly sterile) small clumps in mossy forest, 2800 m., Oct. 1938, *Brass* 10625 ; 9 km. north-east of Lake Habbema, wet bank of open stream in forest, 2650 m. ; Oct. 1938, *Brass* 10882 ; 9 km. north-east of Lake Habbema, common in wet sandy soil of openings in forest,

2800 m., Oct. 1938, *Brass* 10925. —Blake does not cite numbers 10560 and 10625.

The following plant, too young (for me) to determine with certainty, may belong to *C. neo-guineensis*. It was placed by Blake (l. c. 105) under *C. continua*.

NETHERLANDS NEW GUINEA : 15 km. south-west of Bernhard Camp, Idenburg River, rain-forest, one clump in sandy stream-bed, 1500 m., Jan. 1939, *Brass* 12371.

C. sarawaketensis *Kükenth.* in Engl. Bot. Jahrb. 69: 262: 1938; Nelves, l. c. 18, 24.

C. melanophora S. T. Blake in Journ. Arn. Arb. 28 : 106 : 1947.

NETHERLANDS NEW GUINEA : Mt. Wilhelmina, 7 km. north-east of top, abundant on moist grassy cliffs, 3560 m., Sept. 1938, *Brass* & *Meyer-Drees* 9828 (isotype of *C. melanophora*) ; north slopes of Mt. Wilhelmina, wet places in alpine grassland, common, 3950 m., Sept. 1938, *Brass* & *Meyer-Drees* 10046 ; northern slopes of Mt. Wilhelmina, alpine grassland, matted on a rock, 3950 m., Sept. 1938, *Brass* & *Meyer-Drees* 10080.

I am unable to follow Blake in treating *C. sarawaketensis* and *C. melanophora* as distinct species, after comparing the above-mentioned numbers of *C. melanophora* with the type number (*Clemens* 5546) of *C. sarawaketensis* in the Arnold Arboretum herbarium.

C. eremostachya S. T. Blake in Journ. Arn. Arb. 28 : 99 : 1947.

NETHERLANDS NEW GUINEA : 9 km. north-east of Lake Habbema, massed on open beaches of small stream in forest, 2800 m., Oct. 1938, *Brass* 10255.

As pointed out by its author, this species seems most nearly allied to *C. rhizopoda* Maxim. (Sect. *Circinnatae* Meish.). It appears to be somewhat closely related also to *C. hakkodensis* Franch. and *C. petelotii* Gross.

C. capillacea Boott, Illustr. 1 : 44, t. 110 : 1858 ; Nelves, l. c. 6, 25 ; S. T. Blake, l. c. 101.

NETHERLANDS NEW GUINEA : Mt. Wilhelmina, 11 km. north-east of top, in wet grassy valley, 3400 m., Sept. 1938, *Brass* & *Meyer-Drees* 9751.

var. **major** Nelves, var. nov. ; a typo spicis majoribus, utriculis majoribus valde nervosis praecipue differt.

BORNEO : Mt. Kinabalu, 3300 m., *Haviland* 1393.

JAVA : Priangan, G. Papandajan, Tegal Aloen-aloen, 2350 m., 30 March 1930, *Van Steenis* 4289 (type, Kew).

NETHERLANDS NEW GUINEA : Lake Habbema, scattered along grassy shores of lake, 3225 m., Aug. 1938, *Brass* 9085.

Certain Malaysian specimens (Java, Borneo) hitherto determined by Kükenthal and others as *C. rara* Boott or *C. capillacea* Boott, of which *van Steenis* 4289 and *Brass* 9085 are typical examples, seem to me to be varietally, possibly specifically, distinct from *C. capillacea* (*C. rara* is a quite different plant). They have considerably larger spikes, with larger and

more strongly nerved utricles. The Philippines representative has a spike similar in size to that of the type, but with glumes which tend to be more acute at the apex than that of any other member of the group. The Australian and New Zealand *C. capillacea*, incidentally, matches the typical Indian plant very well.

As it was thought that this large-spiked *C. capillacea* might be *C. ovata* Burm., Kew wrote to Geneva to borrow Burman's specimen, but unfortunately it is missing from the Burman Herbarium.

C. acrophila S. T. Blake in Journ. Arn. Arb. 28 : 114 : 1947.

?*C. spathaceo-bracteata* Kükenth. in Engl. Bot. Jahrb. 70 : 466-67 : 1940 ; Nelmes, l. c. 15, 26.

NETHERLANDS NEW GUINEA : Mt. Wilhelmina, 5 miles east of top, common in marshy hollows, 3440 m., Aug. 1938, *Brass* 9409 ; Lake Habbema, common about native camps, 3225 m., Aug. 1938, *Brass* 9515 ; Mt. Wilhelmina, 7 km. north-east of top, alpine grassland, occasional erect tufts in wet ground, 3560 m., Sept. 1938, *Brass & Meyer-Drees* 9829 ; Mt. Wilhelmina, 7 km. north-east of top, plentiful amongst long grasses of a marshy slope, slender tufts, 70-90 cm. high, 3560 m., Sept. 1938, *Brass & Meyer-Drees* 9926 ; Mt. Wilhelmina, northern slopes, common on old grassy scree, 4050 m., Sept. 1938, *Brass & Meyer-Drees* 10072.

Blake notes that the nut is "occasionally subtrigonus". It may also be added that this departure from the usual 2 stigmas, plano-convex utricles, and biconvex achenes of the *Graciles* Tuckerm., is combined with 3 stigmas and trigonous utricles. This handsome species, therefore—its glumes, ranging from 4 to 7.5 mm. in length (excluding awns), proclaiming affinity with the tristigmatic *Decorae* Kükenth.—seems the most primitive member of its group, and of significance in a phylogenetic interpretation of the genus.

Brass 9409 and *Brass & Meyer-Drees* 9926 differ from the other gatherings in narrower leaves, smaller (especially narrower) utricles, and narrower oblong-obovate (not oblong-elliptic) nuts.

I am inclined to think that *C. acrophila* is conspecific with *C. spathaceo-bracteata* Kükenth. I have not yet seen the "types" of this (*Clemens* 7388, 7395A), but two later Clemens gatherings from near the type locality—Mt. Sarawaket, N. ?—E. New Guinea—which appear to belong to this species, were included in the loan from the Arnold Arboretum. They differ from *C. acrophila* in the fascicles being 2-5-nate (not 1-3-nate), the female glumes 4-5.25 (6) mm. long (not 4-7.5 mm.), and the utricles 3.25-4.25 mm. long (not 5-6.25 mm. long). Other characters are closely similar in the two species, the later Clemens gatherings, for example, having the ventral, and sometimes the dorsal, face sparsely hispidulous as in *C. acrophila*. This is evidence of considerable variability in the species, as the type of *C. spathaceo-bracteata* was described as having utricles with glabrous faces. The chief difference seems to lie in length of utricle, though one would expect a greater range in length in a species with large utricles than in a species with small ones.

C. brunnea Thunb. var. **subteinogyna** Kükenth. in Fedde, Repert. 8 : 8 : 1910.

NETHERLANDS NEW GUINEA : 9 km. north-east of Lake Habbema, shrubby edges of a landslip, rare, 2800 m., Oct 1938, *Brass* 10924; Bele River, 18 km. north-east of Lake Habbema, occasional large clumps on grassy, formerly cultivated slopes, 2200 m., Nov. 1938, *Brass* 11592.

These gatherings are a good match of Philippine specimens, at Kew, cited by Kükenthal below his original description of *C. brunnea* var. *subteinogyna*. It may well be found, when more material is available, that this variety merges into its variable and widespread species (in which Blake—l. c. 114—places it), from which it differs in its lighter and brighter, glabrous or glabrescent utricles, through such apparently intermediate forms as *C. kanehirae* Ohwi (Acta Phytotax. et Geobot. 8 : 67 : 1939).

C. breviculmis R. Br., Prodr. 242 : 1810 ; S. T. Blake, l. c. 112.

PAPUA : Central Division ; Murray Pass, Wharton Range, scattered on grassland slopes, 2840 m., June–Sept. 1933, *Brass* 4697.

This New Guinea sedge agrees better with *C. breviculmis* than with the plant described by Nees as *C. royleana* (under which Kükenthal—l. c. 318—cites it), and I fully agree with Blake's remarks about the variation in length of culm in *C. breviculmis*.

C. montivaga S. T. Blake in Journ. Arn. Arb. 28 : 109 : 1947.

C. bulbostylis Kükenth. in Engl. Bot. Jahrb. 69 : 264 : 1938. (Not *C. bulbostylis* Mackenzie, 1915).

NETHERLANDS NEW GUINEA : Lake Habbema, common on wet sandy soil of open ridges, 3225 m., Aug. 1938, *Brass* 9032 ; Lake Habbema, common on sandy patches on wet grassy slopes, 3225 m., Aug. 1938, *Brass* 9339 ; Lake Habbema, alpine grassland, tufted in a sandy pool, 3225 m., Aug. 1938, *Brass* 9582 ; Mt. Wilhelm, 11 km. north-east of top, in small bog, 3450 m., Sept. 1938, *Brass* & Meyer-Drees 9759.

Like Blake, I have not seen the type of Kükenthal's *C. bulbostylis* (*Clemens* 6069), but there seems no doubt that it is the same species as *C. montivaga*, a clearly distinct member of a critical group of *Carices*.

C. perciliata (Kükenth.) Nelmes in Kew Bull. 1946 : 10, 26 : 1946.

C. breviculmis R. Br. var. *perciliata* Kükenth. in Engl. Pflanzenr. IV, 20 : 469 : 1909.

C. bulbostylis Kükenth. var. *ciliato-marginata* Kükenth. in Engl. Bot. Jahrb. 70 : 464 : Jan. 1940 ; et in Bull. Jard. Bot. Buitenz. III, 16 : 318 : Feb. 1940. (Not *C. ciliato-marginata* Nakai.)

C. tricholoma S. T. Blake in Journ. Arn. Arb. 28 : 110 : 1947.

PAPUA : Central Division ; Mt. Albert Edward, few plants amongst grass on banks of a grassland pond, 3680 m., May–July 1933, *Brass* 4274 ; Mt. Albert Edward, sporadic in forest glades, not common, 3680 m., May–July 1933, *Brass* 4316.

C. breviculmis var. *perciliata* Kükenth. was based on a Papuan plant (Mt. Scratchley, 3660 m., 1896, *Giulianetti*). This appears to me to be the same species as that of the *Brass* numbers above. Part of the *Giulianetti* gathering at Kew is a specimen with a culm 50 cm. tall,

bearing spikes with glumes and utricles which are a good match of those of *C. brevis* S. T. Blake, which the author describes as having culms about 2–5 cm. tall. Blake's remark under *C. breviculmis* R. Br., that "the length of culm varies considerably, sometimes even on the same plant, and evidently has no taxonomic importance in this species", seems to apply also to *C. brevis*, and, indeed, to *C. perciliata* also. I am not quite convinced that *C. brevis* is more than varietally separable from *C. perciliata*.

C. brevis S. T. Blake in Journ. Arn. Arb. 28 : 111 : 1947.

C. bulbostylis Kükenth. var. *hispidula* Kükenth. in Engl. Bot. Jahrb. 70 : 464 : Jan. 1940, et in Bull. Jard. Bot. Buitenz. III, 16 : 318 : Feb. 1940. (Not *C. hispidula* Gaud.)

PAPUA : Central Division ; Mt. Albert Edward, common in small tufts on a barren rocky ridge crest, 3680 m., May–July 1933, *Brass* 4418.

C. fascicularis Soland. ex Boott in Hook. f., Fl. Nov. Zeland. 1 : 283 : 1853 ; Nelves, l. c. 12, 27 ; S. T. Blake, l. c., 116.

NETHERLANDS NEW GUINEA : Lake Habbema ; lining open lake shores, on hummocked marshy ground, large erect clumps, 60–100 cm. high, 3225 m., Aug. 1938, *Brass* 9211.

An interesting discovery, the only other known extra-Australasian locality for the species being in Java, where it was found by Horsfield nearly a century and a half ago.

C. oedorrhapha Nelves in Kew Bull. 1939 : 659 : 1939, et 1946 : 8, 27 : 1946.

C. tumida Boott, Illustr. 1 : 66, t. 150 : 1858. (Not *C. tumida* Beilschm., 1850.)

C. olivacea Boott var. *altissima* Kükenth. in Engl. Bot. Jahrb. 70 : 467–68 : Jan., 1940, et in Bull. Jard. Bot. Buitenz. III, 16 : 321 : Feb., 1940.

PAPUA : Central Division ; Mt. Tafa, very abundant in large tussocks on muddy banks of a pond in forest, 2400 m., May–Sept 1933, *Brass* 4865.

In Malaysia the glumes of this species become more or less hispidulous—in India, Indo-China, and China they are glabrous or nearly so—and the swelling in the beak of the utricle becomes less marked. I cannot agree with Kükenth. that *Brass* 4865 has any close connection with *C. olivacea*. Blake does not appear to have seen this number.

C. brownii Tuckerm. Enum. Meth. 21 : 1843 ; Nelves, l. c. 8, 27 ; Blake, l. c. 115.

NETHERLANDS NEW GUINEA : Balim River, frequent in shallow grassy pools, erect tufts 50–60 cm. high, 1600 m., Dec. 1938, *Brass* 11791.

This locality lies between its only other known areas : Australasia to the south, and Japan (including Korea) to the north.

C. tricuspidata Kükenth. in Engl. Bot. Jahrb. 70 : 466 : 1940 ; Nelves, l. c. 11, 27 ; Blake, l. c. 113.

NETHERLANDS NEW GUINEA : Mt. Wilhelmina ; 11 km. north-east of top, covering the sandy bottom of a stream, 3400 m., Sept. 1938, *Brass & Meyer-Drees* 9803 ; 4 km. north-east of top, tufted on grassy seepages, 3650 m., Sept. 1938, *Brass & Meyer-Drees* 9970.

The description of *C. brachyathera* Ohwi (Jap. Journ. Bot. 7 : 190 : 1934) agrees closely with that of *C. tricuspidata*, but a specimen received from Dr. Akiyama, labelled *C. brachyathera*, is a different species. Until one can see the type of Ohwi's species, therefore, and also that of *C. tricuspidata* (*Clemens* 7385 bis), this nomenclatural problem must remain.

Blake rightly remarks on the variability of this species.

In a utricle from a specimen collected by Mr. Boden Kloss on the Utakwa Expedition to Mt. Carstensz I found two achenes. During the past twenty years I have opened some thousands of *Carex* utricles, but this is the first seen with twin nuts.

C. finitima Boott, Illustr. 1 : 44, t. 112 : 1858.

PAPUA : Central Division ; Mt. Albert Edward, a rare plant, tufted, on a broken cliff face, 3680 m., May-July 1933, *Brass* 4407.

New for New Guinea. A great and unexpected extension of range, since it has been known hitherto only from the eastern Himalaya and western China. It is not at all closely related to any other New Guinea sedge. Blake does not seem to have seen this gathering.

C. philippinensis Nelmes in Kew Bull. 1938 : 109 : 1938, et in 1946 : 14, 27 : 1946.

C. pandanus Ohwi in Bot. Mag. Tokyo, 56 : 214 : 1942.

C. euphlebia S. T. Blake in Journ. Arn. Arb. 28 : 108 : 1947.

PAPUA : Central Division ; Mt. Albert Edward, amongst coarse tussock grass on deforested slope, stiff sedge in broad spreading tussocks, 3800 m., May-July 1933, *Brass* 4386.—Determined by Kükenthal (l. c. 317) as *C. Graeffeana* Boeck.

NETHERLANDS NEW GUINEA : 9 km. north-east of Lake Habbema, few scattered clumps in stony bed of stream, 2800 m., Oct. 1938, *Brass* 10559 ; 9 km. north-east of Lake Habbema, common about native huts, on open banks of stream, etc., clumps 50-60 cm. high, 2800 m., Oct. 1938, *Brass* 10734 ; 9 km. north-east of Lake Habbema, common on open banks of a stream, 2650 m., *Brass* 10877.

Both Clarke and Kükenthal included the Philippines plant under *C. graeffeana* Boeck., a Fijian species, with smaller, differently shaped, less spreading utricles. The Brass plants, and also specimens which I have seen from Java, seem to me to broaden somewhat, but to be conspecific with, *C. philippinensis*. I have not seen *C. pandanus*, but its description leads me to the opinion that it is the same species.

C. lacerans Kükenth. in Engl. Pflanzenr. IV, 20 : 326 : 1909 ; Nelmes, l. c. 12, 28.

NETHERLANDS NEW GUINEA : Lake Habbema, common on marshy banks of streams, 3225 m., Aug. 1938, *Brass* 9234 ; Mt. Wilhelmina, 7 km. north-east of top, few plants on boggy grasslands, 3700 m., Sept. 1938, *Brass & Meyer-Drees* 9923.

These Brass gatherings seem to me to agree rather more with *C. lacerans*, described from a Papuan plant, than with *C. gaudichaudiana* Kunth (under which Blake places them). *C. lacerans* appears to differ from all the varieties and forms of *C. gaudichaudiana* in its muticous glumes and its smaller and more abruptly beaked utricles, but until this very polymorphic Australian species is carefully studied, the placing of the New Guinea material can be only tentative.

C. appressa *R. Br.* Prodr. Fl. N. Holl. 242 : 1810 ; Nelves, l. c. 13, 28 ; Blake, l. c. 101.

NETHERLANDS NEW GUINEA : Lake Habbema ; gregarious on wet low shores of lake, erect in clumps to 1.5 m. high, 3225 m., Aug. 1938, *Brass* 9248.

Hitherto known only from Australasia and New Caledonia.

C. perileia *S. T. Blake* in Journ. Arn. Arb. 28 : 102 : 1947.

NETHERLANDS NEW GUINEA : Lake Habbema ; marshy shores of lake, 3225 m., Aug. 1938, *Brass* 9583.

An interesting species, related, as Blake says, to *C. echinata* Murr., but clearly specifically distinct.

C. curta *Gooden.* in Trans. Linn. Soc. 2 : 145 : 1794 ; Nelves, l. c. 7, 29 ; Blake l. c. 101.

NETHERLANDS NEW GUINEA : Lake Habbema ; common on marshy flats, 3225 m., Aug. 1938, *Brass* 9037 ; Lake Habbema, moist burnt-over ground in a native camp, 3225 m., Aug. 1938, *Brass* 9119 ; Lake Habbema, open grassland, plentiful in wet sandy soil, 3225 m., Aug. 1938, *Brass* 9539.

An interesting discovery of a common northern hemisphere sedge. This New Guinea plant matches well the form with fulvous, silvery-margined glumes found in Scotland and other parts of Europe. In its regularly and slenderly nerved utricles it is, perhaps, nearer the type than is the Australian form, with its utricles fewer- and stronger-nerved.

C. sp., aff. *C. filicina* Nees and *C. neo-guineënsis* C. B. Clarke.

NETHERLANDS NEW GUINEA : 18 km. north-east of Lake Habbema : Bele River, occasional clumps on open banks of river, 2200 m., Nov. 1938, *Brass* 11540.—Probably an undescribed species, but I agree with Blake that it is too immature to describe.

C. sp., aff. *C. arenicola* F. Schmidt.

NETHERLANDS NEW GUINEA : Lake Habbema ; common in sunny bogs, 3225 m., Aug. 1938, *Brass* 9235.—Probably new but too young to describe.

This is evidently very close to *C. arenicola*, an Asiatic species, differing in its narrower leaves and smaller inflorescence, and possibly also in utricle characters, but these are undeveloped.

NOTES ON CYPERACEAE: XXIII.

The Clemens New Guinea Carices.

E. NELMES.

As mentioned in the previous Note, the Arnold Arboretum set of *Carex* collected by Mr. & Mrs. Clemens in North-East (formerly German) New Guinea in 1936-41 was kindly loaned to Kew for my study. The results of this study are given below.

All the specimens were collected in Morobe District. Only a few of the sheets bear labels giving the complete field notes, and as I have not had access to the other field labels, except for the data from them published by Dr. G. Kükenthal in Engler's Bot. Jahrb., many of the citations accompanying my determinations lack details of locality and habitat.

My examination of the Clemens *Carices* was considerably handicapped by their being much bent and folded, and thus difficult to examine, measure and describe. Many of the gatherings are mixtures, each consisting of two, sometimes three, species.

The Clemens sedges examined by Kükenthal, so far as I have seen the same numbers, his determinations, and descriptions of new species (in Engl. Bot. Jahrb. 69 : 261-65 : 1938, and 70 : 464-68 : 1940), are included in the following account.

The plan of brief synonymy adopted in the previous Note is also followed here.

Carex rhizomatosa Steud. in Zoll. Verz. Ind. Archip., Heft 1, 60 : 1854 (nomen, et Synops. Pl. Glum. 2, Cyper. 206:1855 ; Kükenth. in Engl. Bot. Jahrb. 69 : 264 : 1938 ; Nelmes in Kew Bull. 1946 : 17, 22 : 1946.

C. breviceps Kükenth. in Engl. Bot. Jahrb. 69 : 263-64 : 1938.

Salamaua, grassy hill near the Malalo Mission, 240-300 m., 4 Nov., 1936, Clemens 4347 ; vicinity of Kajabit Mission, 240-600 m., Aug.-Dec. 1939, Clemens 10603.

C. breviceps Kükenth. was based on Clemens 4347, which, as represented in the Arnold Arboretum herbarium, is not (for me) specifically distinct from *C. rhizomatosa*.

C. horsfieldii Boott in Proc. Linn. Soc. 1 : 257 : 1845 ; Nelmes, l. c. 19, 23.

C. fleckeri Nelmes in Kew Bull. 1939 : 313 : 1939.

[*C. indica* (non L.)—Kükenth., l. c. 262.]

Malalo Mission, forest path, 600-900 m., 12 Nov. 1936, Clemens 4378.

The type specimen of *C. horsfieldii* Boott, collected in "Java", which has hitherto been the only specimen of the species known to me, is very immature, and when I was describing the Australian *C. fleckeri* the two plants appeared to represent two species. This Clemens plant, however, seems intermediate between the two and leads me to a changed opinion, which has been further strengthened by an examination of Javanese specimens of *C. horsfieldii* on loan from Leiden.

C. horsfieldii is clearly distinct from *C. indica* by the much shorter male part of its spike and its trigonous non-inflated utricles.

Carex tytholepis *Nelmes*, sp. nov. ; affinis *C. fissili* Boott, sed spicis brevioribus, glumis minoribus enervibus, utriculis minoribus, rostris brevioribus sparse hispidulis praecipue differt. — *C. neo-guineënsis* C. B. Clarke var. *laxior* Kükenth. in Engl. Bot. Jahrb. 69 : 262 : 1938.

Caespitosa. Culmi erecti, trigoni, angulis obtusi vel acuti, 50–100 cm. alti, inferne 1.5–2.5 mm. crassi, inferne laeves, superne sub nodos ipsos minute hispiduli, basi vaginis vinaceis paucis circumdati. Folia basilaria vel subbasilaria, longa sed culmo breviora, 3–6 mm. lata, plerumque valde revoluta sed interdum planiuscula, rigida, supra dense scabrida, costata ; vaginae vinaceae, marginibus membranaceae demum reticulatim fissae. Inflorescentia composite interrupte paniculata, 25–35 cm. supremos culmorum occupans ; paniculae secundariae 6–8 singulae vel inaequaliter binae, erectae vel suberectae, = oblongae vel oblongo-lanceolatae, 2–6 cm. longae, 1–2 cm. crassae, distantes vel subdistantes, breviter vel longissime pedunculatae ; pedunculi trigoni vel compressi, inferne laeves, superne scabro-hispiduli. Rhachis dense hispidula. Bractae panicularum inferiorum foliaceae, culmum superantes, longe vaginantes, bractae superiores multo minores, breviter vaginantes ; vaginae saepe minute hispidulae et leviter rubrinerves. Spicae numerosae, androgynaeceae, 3–7 mm. longae, 3–4 mm. crassae, patulae vel patentes, sessiles, parte mascula parti femineae aequilonga vel ea multo brevior. Bracteolae squamiformes sed longiaristatae. Cladophyllum parvum, utriculiforme, glabrum. Glumae femineae ovatae, interdum triangulari-ovatae vel oblongo-ovatae, cymbiformes, apice obtusae vel obtusissimae, saepe ciliolatae, 0.75–1.25 mm. longae, 0.7–0.9 mm. latae, subtranslucentes, subadpresso-albido-hispidulae, pallidae vel brunneae, marginibus late albo-hyalinae, enerves, nervo mediano in aristam 0.5–1.25 mm. excurrente. Utriculi oblongo-ellipsoidei, interdum ellipsoidei, distincte trigoni, (2.5) 2.75–3 mm. longi, 0.9–1 mm. lati, membranacei, dorso valde circiter 6-nerves, ventre 3–4-nerves, vix marginati, laeves, glabri, apice recurvi, demum patuli vel subpatentes, luteo-virides, vix vel brevissime stipitati, apice subabrupte vel abrupte rostrati ; rostrum subteres, vix acuminatum, angustissime marginatum, glabrum vel marginibus sparse hispidulum, saepe rubidum, bidentulum, circiter 1 mm. longum ; dentes circiter 0.25 mm. longi, apice albo-hyalini, demum erosi. Achaenium ellipsoideum vel oblongo-ellipsoideum, trigonum, 1.5–1.6 mm. longum, 0.8–0.9 mm. latum, demum brunneum, haud stipitatum, abrupte rostratum ; rostrum valde inflexum, circiter 0.25 mm. longum. Stylus vix basi incrassatum, sed interdum inflexum. Stigmata 3.

North-East New Guinea: Ogeramang, by forest paths, 1740 m., 14 Dec. 1936, Clemens 4611.

This was one of several numbers cited by Kükenth. under his *C. neo-guineënsis* var. *laxior*. As I think, it does not belong to this group of *Indocarices*, nor does it appear to have any close relatives, though it shows some apparent affinity with the New Caledonian *C. fissilis* Boott.

C. neo-guineënsis C. B. Clarke in Journ. Linn. Soc. 37 : 12 : 1904 ; Nelmes, l. c. 19, 24.

C. neo-guineënsis C. B. Clarke var. *laxior* Kükenth. in Engl. Bot. Jahrb. 69 : 262 : 1938.

Mt. Sarawaket, near Busu River, open paths, common, 31 Jan. 1937, *Clemens* 5259 ; Mt. Sarawaket, 2400–2700 m., 8 March 1937, *Clemens* 6080 ; 5 April 1937, *Clemens* 6081 ; Ulap trail, 6 April, 1940, *Clemens* 41141.

Clemens 5259 is one of five of their gatherings cited by Kükenthal under his var. *laxior*. I have not seen the other four, but if they are the same thing as the fifth—and I have seen other similar gatherings—they appear to differ from the type only in possessing a more open inflorescence, an intraspecific variation not confined to this species.

C. sarawaketensis Kükenth. in Engl. Bot. Jahrb. 69 : 262 : 1938 ; *Nelmes*, l. c., 18, 24.

Mt. Sarawaket, grassy rise near a pond, 2400–2700 m., March 1937, *Clemens* 5546.

Another addition, and a distinctive one, to the *Indocarices* of New Guinea.

var. **glabrinus** Kükenth. in Engl. Bot. Jahrb. 70 : 464 : 1940.

Mt. Sarawaket, overhanging rocks on a steep mountain-side, 2400–2700 m., March 1937, *Clemens* 6082 ; Ulap trail, wet scrub-hills, 6–7 April 1940, *Clemens* 41167.

Differing from the type only, but strikingly, in its smooth utricles.

var. **minor** Kükenth. in Engl. Bot. Jahrb. 69 : 263 : 1938.

Bulung River, in scrub, 865 m., 9 Feb. 1937, *Clemens* 5355.

A distinctly smaller plant than the type, and possessing other distinguishing characters which may prove more than varietal.

C. gibbsiae Rendle var. ?

Matap Station, mossy, bushy slope, 1500–1800 m., 13 March 1940, *Clemens* 41023.

This plant is in poor condition and is attacked by an insect, so that its important characters cannot be accurately described. So far as it can be understood, its nearest relative is *C. gibbsiae* Rendle, from which it differs principally in having much smaller glumes and utricles.

C. celebica Kükenth. in Engl. Bot. Jahrb. 70 : 465 : Jan. 1940, et in Bull.

Jard. Bot. Buitenz. III, 16 : 318–19 : Feb. 1940 ; *Nelmes*, l. c. 8, 25.

?*C. constricta* S. T. Blake in Journ. Arn. Arb. 28 : 112 : 1947.

Mt. Sarawaket, 2400–2700 m., 8 March 1937, *Clemens* 6073 (Kükenthal's 6073B ?—one culm, collected and mounted with a much larger amount of *C. lacerans* Kükenth.—Kükenthal's 6073A ?) ; Mt. Sarawaket, 4050 m., 8 April 1937, *Clemens* 6076 (collected and mounted on a sheet with *C. lacerans* and *C. perciliata* (Kükenth.) *Nelmes* ; cited in future by me as 6076 C).

It will be noted above that descriptions of *Carex celebica* appeared in two publications almost simultaneously. In the Buitenzorg Bulletin, which Kükenthal may have thought would appear first, the only specimen cited

under the species is *Kjellberg* 3730, from Celebes. In Engler's Bot. Jahrb., which actually appeared a month earlier than the other, the same description is published, with very slight modifications, obviously to cover the two Clemens numbers with which Kükenthal is there chiefly concerned. Before, however, citing the Clemens gatherings, Kükenthal states: "Der Typus der Art wurde auf Celebes, B. Poka Bindjang, Gebergsheide bei 2700 m. Höhe im Juli 1929 entdeckt (leg. G. Kjellberg n. 3730!)."

At the end of the description of his *C. constricta* (based on MacGregor, Papua), Blake says: "In habit it appears to be close to *C. celebica* Kükenth., differing (so far as can be judged from the description) in the truncate mucronate (not acute) glumes and coarser spikes with more spreading utricles." Blake and I have not seen the type of *C. celebica*, and I have not seen the type of Blake's *C. constricta*. I have, however, seen the Arnold Arboretum sheet of *Clemens* 6073, containing both *C. lacerans* and *C. celebica*, the latter cited by Kükenthal as 6073, this being Kükenthal's first citation under the Engl. Bot. Jahrb. description. This specimen has glumes with an emarginate or truncate apex, spikes 2-3 mm. thick, and patulous utricles, thus substantially agreeing with Blake's *C. constricta* but at variance with Kükenthal's description of his *C. celebica*, i.e., glumes acute, spikes $1\frac{1}{2}$ mm. thick, and utricles suberect. It may be pointed out that many species of *Carex* have acute and obtuse glumes on the same spike, and that utricles are usually sub-erect when young but often become spreading at maturity, which would also thicken the spikes. There I must leave the matter for the moment, but I hope, eventually, to see the types of both *C. celebica* and *C. constricta*.

C. spathaceo-bracteata Kükenth., in Engl. Bot. Jahrb. 70 : 466-67 : 1940 ; Nelves, l. c. 15, 26.

Rawlinson Range, 2100-3600 m., 25 July 1941, *Clemens* 12405 ; *ibid.*, 14 Aug. 1941, *Clemens* 12488.

See comments under *C. acrophila* S. T. Blake in the previous Note. These are the two Clemens numbers referred to there.

C. brunnea Thunb. var. **subteinogyna** Kükenth. in Fedde, Repert. 8 : 8 : 1910.

Bulung Pass, near Kuak [River], mossy forest, 1500-1800 m., 26 Nov. 1936, *Clemens* 4427 ; Mt. Sarawaket, among mossy bushes, 2400-2700 m., 3 April 1937, *Clemens* 5552 ; Mt. Sarawaket, 3 March 1937, *Clemens* 5634 ; *ibid.*, 2400-2700 m., 9 March 1937, *Clemens* 6088 ; *ibid.*, 1 April 1937, *Clemens* 6089.

These specimens appear to belong to Kükenthal's variety, with less hispidulous utricles, but it seems of little value.

C. cryptostachys Brongn. in Duperry, Voy. "Coquille", Bot. 152, t. 25 : 1828 ; Kükenth. l. c. 265 ; Nelves, l. c. 20, 26.

Quembung, wooded slope, 750 m., *Clemens* 1178.

A typical specimen of this remarkable but homogeneous species.

C. breviscapa C. B. Clarke in Hook. f. Fl. Brit. Ind. 6 : 736 : 1894 ; Kükenth. l. c., 265 ; Nelves, l. c. 10, 26.

Sattelberg, towards the Quembung Mission, forest path, 960 m., *Clemens* 985 ; Salamaua, Malalo Mission, Mt. Ako, bank near forest path, 600 m., 12 Nov. 1936, *Clemens* 4420.

An expected extension of range of a representative of that remarkable section, Sect. *Lageniformes* Ohwi. The species was originally described from a Ceylon specimen, but is now known throughout much of Malaysia and from Queensland.

C. perciliata (Kükenth.) Nelves in Kew Bull. 1946 : 10, 46 : 1946.

C. breviculmis R. Br. var. *perciliata* Kükenth. in Engl. Pflanzenr. IV, 20 : 469 : 1909.

Mt. Sarawaket, 4050 m., 8 April 1937, *Clemens* 6076 (collected and mounted with *C. lacerans* Kükenth. and *C. celebica* Kükenth., and cited by me in future as 6076 B ; *ibid.*, 2400-2700 m., 2 March 1937, *Clemens* 6078 (with *C. doniana* Spreng. and cited in future as 6078 B) ; *ibid.*, 3 April 1937, *Clemens* 6079 (with *C. doniana* Spreng. and cited in future as 6079 B).

Hitherto known only from Papua.

C. pocilliformis Boott, Illustr. 4 : 175, t. 593 : 1867 ; Nelves, l. c. 8, 26.

C. tristachya Thunb. var. *pocilliformis* (Boott) Kükenth. in Engl. Pflanzenr. IV, 20 : 473 : 1909, et in Engl. Bot. Jahrb. 70 : 465 : Jan. 1940:

Mt. Sarawaket, 2400-2700 m., March-April 1937, *Clemens* 6087 (a single stem of *C. finitima* Boott mounted with it).

A south-eastern extension of distribution from the Philippines, the only other known Malaysian area.

C. finitima Boott, Illustr. 1 : 44, t. 112 : 1858.

C. fusiformis Nees var. *enerveosa* Kükenth. in Engl. Bot. Jahrb. 70 : 467 : 1940.

Mt. Sarawaket, frequent on bushy and grassy slopes, 3600-3900 m., 6-9 April 1937, *Clemens* 6090.

See comment on this species in preceding Note. In my opinion the New Guinea plant agrees well with the Indian representatives of the species. Kükenth's choice of varietal epithet supports this, since the chief character distinguishing *C. finitima* from *C. fusiformis* is its nerveless utricle, that of *C. fusiformis* being distinctly nerveous.

C. neurochlamys F. Muell. Fragm. 8 : 258 : 1874 ; Nelves, l. c. 9, 27.

C. maculata Boott var. *neurochlamys* (F. Muell.) Kükenth. in Engl. Pflanzenr. IV, 20 : 428 : 1909, et in Engl. Bot. Jahrb. 69 : 264 : 1938.

Mt. Sarawaket, Buru River and vicinity, mossy woods and open places, 1800-2400 m., 12 May 1937, *Clemens* 6326.

A northward extension of this Australian and lower Polynesian species.

C. ?doniana Spreng. Syst. 3 : 825 : 1826 ; Nelves, l. c. 12, 27.

C. japonica Thunb. var. *mesogyna* Kükenth. in Engl. Bot. Jahrb. 69 : 265 : 1938.

Tobou to Kuak River, mossy forest path, 1500 m., *Clemens* 4451 (a stem of *Scleria* sp. mounted with this) ; Mt. Sarawaket, in high grass along wet paths, 2400-2700 m., *Clemens* 5551; *ibid.*, 2 March 1937, *Clemens* 6078; *ibid.*, 3 April 1937, *Clemens* 6079 (6078 and 6079 mounted with *C. perciliata*, and cited in future as 6078 A and 6079 A).

My first impression was that these specimens were large forms of *C. subtransversa* C. B. Clarke, but further examination led me to relate them more closely to *C. doniana*. Further study will be necessary before their final position can be determined in what is a critical section of closely related species.

C. philippinensis *Nelmes* in Kew Bull. 1938: 109: 1938, et in Kew Bull. 1946: 14, 27: 1946.

[*C. graeffeana* (non Boeck.)—Kükenth. l. c. 264.]

Kuak River divide, in mossy forest, 2010 m., 26 Feb. 1936, *Clemens* 4421; Ogeramngang, in forest, 1755 m., 1 Dec. 1936, *Clemens* 4455; My Kudose, Seggele, forest path, 1800 m., *Clemens* 4940 A; Mantoat, open wet place on mountain, 1200-1500 m., 12 Jan., 1940, *Clemens* 10976 B; Matap, 1500-1800 ft., 6 Feb.-6 April 1940, *Clemens* 11250.

See remarks under this species in previous Note.

C. lacerans *Kükenth.* in Engl. Pflanzenr. IV, 20: 326: 1909; *Nelmes*, l. c. 12, 28.

C. gaudichaudiana Kunth. var. *humilior* *Kükenth.* in Engl. Bot. Jahrb. 69: 264: 1938.

Mt. Sarawaket, Bog Meadow camp, about ponds, marshland, common, 2400-3000 m., April 1937, *Clemens* 5549; Mt. Sarawaket, sides of ponds, 2400-2700 m., *Clemens* 5555 (mounted with *C. perileia* S. T. Blake and cited in future as 5555 B); Mt. Sarawaket, 2400-2700 m., 8 March 1937, *Clemens* 6073 (*Kükenth.*'s 6073 A ?—mounted with *C. celebica* *Kükenth.*—*Kükenth.*'s 6073 B ?); *ibid.*, 5 March 1937, *Clemens* 6074; *ibid.*, 2700 m., *Clemens* 6075; *ibid.*, 4050 m., 8 April 1937, *Clemens* 6076 (mounted with *C. perciliata* (*Kükenth.*)) *Nelmes* and *C. celebica* *Kükenth.* and cited in future as 6076 A).

The opinion expressed under *C. lacerans* in the previous Note applies equally well here.

C. appressa *R. Br.* Prodr. Fl. Nov. Holl, 242: 1810; *Kükenth.* l. c. 261; *Nelmes*, l. c. 13, 28.

Mt. Sarawaket, Bulung River, 900 m., 30 Jan. 1937, *Clemens* 5219.

The second record of this Australasian species from New Guinea.

C. perileia *S. T. Blake* in Journ. Arn. Arb. 28: 102: 1947.

[*C. echinata* (non Murr.)—*Kükenth.* l. c. 262.]

Mt. Sarawaket, 2400-2700 m., 10 March 1937, *Clemens* 5554 A (one stem only, the gathering consisting mainly of a *Luzula* sp.); *ibid.*, margins of ponds, April 1937, *Clemens* 5555 (mounted with *C. lacerans* *Kükenth.* and an unidentified plant, not a *Carex*, and cited in future as 5555 A).

These numbers match Blake's type (*Brass* 9583) fairly well, the only gathering of this species hitherto known, but their utricles have a slightly shorter beak.

ADDITAMENTA AD FLORAM ANATOLIAE. I.

P. H. DAVIS.

This is the first of a series of taxonomic papers dealing with my collections from Asia Minor, and annotates the *Labiatae* gathered on a journey in S.W. Anatolia from July to September, 1947. A general account of the expedition, and a map of the route followed, appeared in J. Roy. Hort. Soc. **74** (3-4) : 1949. I was accompanied on my journey by Kâmil Bilger, Botanical Assistant at the Y.Z.E. in Ankara.

The mountains visited were mainly in Caria, Lycia, Pamphylia and Isauria. But excursions were also made in Galatia (including a visit to the Black Pine forests of Beynam about 30 km. S. of Ankara) and I have cited these Galatian records as many of the summer flowering species are not mentioned by Krause (Ankaranin Floru, 1937). A September visit to Bithynian Olympus, however, has not been included.

Attention is drawn in particular to Tahtali Dağ (ancient Solyma) in Lycia. This mountain had not been previously botanised, and was found to possess an exceptionally rich flora that includes many new species—several of a relict type—due to its favourable position between the main eastern range of the Lycian Taurus and the sea. The area requires further investigation, and is comparable in richness only to such favoured Mediterranean ranges as the Sierra de Gazorla in Spain and the White Mountains of Crete. Of the other mountains I visited in Turkey, Sandras Dağ in Caria and Girdev (Eren) Dağ in Lycia were botanised by Prof. O. Schwarz in 1938, and Geyik Dağ (Gheidagh) in Isauria by Heldreich in 1845. Boz Dağ near Acipayam in Caria has hitherto been virtually unknown botanically, but Baba Dağ (ancient Anticragus) in Lycia was superficially botanised by Forbes in 1842, Bourgeau in 1882, and apparently by Pichler in 1883.

The determination of my gathering should add considerably to our knowledge of this part of Anatolia, and indicate the floral relationships of the area with Greece, the Aegean islands and Cyprus.

No apology, I hope, is required for beginning with the *Labiatae*; being usually left to the last, botanists have not infrequently failed to reach in their publications this family which is so richly represented in the area I visited. I am determined that such a fate will not overcome the *Labiatae* on this occasion.

I am indebted to Dr. K. H. Rechinger for determining the species of *Scutellaria*, *Teucrium* Sect. *Chamaedrys* and *Phlomis* Subgen. *Gynunophlomis*, to Dr. K. Ronniger for identifying *Thymus*, and to Prof. O. Schwarz for his collaboration in the naming of certain species. For help and advice I am particularly grateful to Professor Sir William Wright Smith. The taxonomic work was largely undertaken at the Kew and Edinburgh Herbaria with the aid of a grant from The Royal Society. The first set of specimens (including all types) is deposited in the Kew Herbarium.

Genera and species are arranged alphabetically. If a district name (chosen for convenient reference) does not follow the modern province (*vilâyet*) name, assume that the district is synonymous with the province. The names of the Roman provinces (used in the sense of Boissier) are

given in brackets. I have endeavoured to follow modern Turkish spelling, with the chief exception of the undotted *i* ; mine are all dotted.

LABIATAE. *A. L. Jussieu*, Gen. Pl. 110 (1789).

Ajuga bombycina Boiss., Fl. Or. **4**, 803 (1879).

Prov. Antalya, distr. Alanya (Pamphylia) : Alanya, stony calcareous slopes above the harbour, annual or biennial, Aug. 23, 1947, No. 14490.

A. chia Schreb. var. **latiloba** Boiss., Fl. Or. **4**, 803 (1879).

Prov. Muğla, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, 2300 m., fl. yellow, Aug. 6, 1947, No. 14490. Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2440 m., perennial, procumbent, not saxatile, leaves green, Aug. 31, 1947, No. 14500 ; *ibid.*, 2590 m., No. 14545 ; Ak Dağ (S. of Geyik Dağ) 2300 m., rocky places facing N., procumbent, fl. golden yellow, Aug. 28, 1947, No. 14383.

var. **suffrutescens** Boiss., Fl. Or. **4**, 893 (1879).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ above Geyran Yaylâ, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, S. side, 2000 m., in sheltered cultivated hollow, fl. yellow, Aug. 5, 1947, No. 13862. Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2430 m., Aug. 31, 1947, No. 14525.

Ballota cristata P. H. Davis, sp. nov. (Sect. *Beringeria* (Neck.) Benth.).

A. B. rugosa (Russ.) Benth. rhizomate repente, haud rupicolo, indumento dense stellato albo-canescens, folis basi haud cordatis, bracteis lineari-spathulatis duas partes calycis aequantibus, dentibus calycis semper brevissimis, galea corollae albae pilis erectis conspicue niveo-cristata facile distinguenda.

Rhizoma lignescens, breviter repens, ramosum. *Caules* erecti, 15–25 cm. alti, indumento dense stellato canescens (inferne admixtione pilorum simplicum), superne ramosi. *Folia* petiolata ; lamina ovata, basi cuneata vel truncata, minutissime crenata, pilis densis stellatis albo-canescens, subrugosa, 1–1·8 (2) cm. longa, 0·7–1·2 (1·5) cm. lata, petiolo 4-plo longior. *Verticillastra* 7–20-flora foliis floralibus sub-breviora, 1·5–2·5 cm. lata, pedunculis brevissimis. *Bractae* lineari-spathulatae indumento stellato duas partes calycis aequantes. *Calyx* tubulosus, 7–8 mm. longus, stellato-sublepidotus, conspicue 10-costatus, ad medium 2–2·5 mm. latus, superne paulo constrictus, in limbum 1·5–2 mm. longum paulo patens in denticulos decem breviter triangulares mucronatos (quinque longiores ad 1 mm. longos, alternatos vix 0·5 mm. longos) fissum. *Corolla* 1·3–1·4 cm. longa, alba, tubo haud exserto supra medium piloso-annulato ; labium inferius valde divaricatum trilobatum lobo mediano profunde bilobulato lobis lateralibus saltem duplo longiore ; labium superius quadridentatum pilis longis erectis in pagina superiore cristam 2·5 mm. longam formantibus. *Stamina* posteriora anterioribus paulo breviora. *Nuculae* vix 2 mm. longae, anguste ovatae, subtriquetrae nigro-fuscae, laeves, superne paulo depressae. Floret Aug.

Prov. Antalya (Lycia) : Tahtali Dağ (above Kemer), near Çukur Yaylâ, c. 1600 m., in stony calc. soil with *Satureia cuneifolia* and *Origanum minutiflorum*, rootstock creeping, Aug. 15, 1947, Davis 14181 (*Typus* in Herb. Kew.).

Ballota cristata is a very distinctive new species related to *B. rugosa* (Russ.) Benth. from which it differs by its shortly repent non-saxatile habit, dense stellate indumentum, leaf shape, longer linear-spathulate bracts, and by the conspicuous crest of hairs on the hood of the white (not purplish) corolla.

B. nigra L. subsp. **ruderalis** (Sw.) Briq., Lab. Alp. Mar. 275 (1893).

Prov. Ankara (Galatia) : Beynam, 1200 m., crevices of out-cropping limestone rock in *Quercus maquis*, obviously indigenous, Jul. 7, 1947, No. 13024 ; Hacıkadun valley near Kecioren, Jul. 9, 1947, No. 13185a.

subsp. **foetida** (Lam.) Hayek, Prodr. Fl. Balc. 2, 278 (1929).

Prov. Muğla (Caria) : Muğla, on waste ground, fl. mauve, Jul. 20, 1947, No. 13488.

B. pseudodictamnus (L.) Benth., Lab. Gen. et Sp. 594 (1834).

Prov. Muğla, distr. Fethiye (Lycia) : Minara, Jul. 31, 1947, No. 13707. Outside Lycia the species occurs in Crete, Kythera, Antikythera and Cyrenaica.

B. rugosa (Russ.) Benth., Lab. Gen. et Sp. 596 (1834).

Prov. Antalya, distr. Alanya (Pamphylia-Isauria) : between Kizil Kaya Dibi and Kizil Alan, rocks, Aug. 28, 1947, No. 14457.

Calamintha exigua (S. et S.) Hal., Consp. Fl. Gr. 2, 546 (1902).

Prov. Muğla, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, S. side, 2200 m., Aug. 5, 1947, No. 13858.

C. incana (S. et S.) Boiss. ex Benth. in DC., Prodr. 12, 226 (1848).

Prov. Antalya, distr. Alanya (Pamphylia) : Alanya, Aug. 23, 1947, No. 14487.

C. nepeta (L.) Savi, Fl. Pisana, 2, 63 (1798).

Prov. Denizli (Caria) : between Denizli and Taş Ocağı, 900 m. perennial, fl. pale mauve, Jul. 13, 1947, No. 13237.

C. origanifolia (Lab.) Boiss., Fl. Or. 4, 579 (1879) *sensu lato*, incl. *C. floridae* Boiss.

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, in gravel of dry stream bed in *Pinus nigra* subsp. *pallasiana* zone, fl. pale mauve, Jul. 16, 1947, No. 13404. Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, 2100 m., N. scree, fl. white, Aug. 16, 1947, No. 14144 ; distr. Alanya (Isauria), Ak Dağ, S. of Geyik Dağ, 2200 m., scree, fl. violet, Aug. 28, 1947, No. 14327, and Ak Dağ W. of Geyik Dağ, 2100 m., near Kara Buynus Yayla, fl. violet, Aug. 31, 1947, No. 14533.

C. origanifolia (Lab.) Boiss. was originally described (under *Clinopodium*) by Labillardière (Ic. Pl. Syr. Rar. 4, 14 : 1812) and based on his material from Lebanon. From the Cilician Taurus Boissier described *C. florida* Boiss. (Diagn. Pl. Or. Ser. I, 12, 51 : 1853), claiming that it differed from *C. origanifolia* in its larger leaves, and corolla with the tube and stamens exerted. *Satureia labillardieri* Briquet (in Annuaire Conserv. & Jard. Bot. Genève, 1898 : 187) was later based on another gathering of Labillardière's from the Lebanon, but this was reduced to a sub-species of

C. organifolia by Bornmüller (in Beih. Bot. Centr. **31** (2) 248 : 1914) ; he pointed out that the difference in the shape of the calyx teeth was the only constant distinguishing character. Whereas the typical form of *C. organifolia* is apparently confined to the Central Lebanon (Sannin), subsp. *labillardieri* is found only in the North of the range. In indumentum the group shows considerable variation, in Anatolia as well as in the Lebanon : Boissier described a shaggy variety of *C. organifolia* (var. *velutina* Boiss., Diagn. Pl. Or. Ser. I. **12**, 51 : 1853—omitted in Boiss., Fl. Or.) from Pisidia, and Bornmüller has based *C. florida* var. *villicaulis* Bornm. (in Fedde, Repert. **49**, 250 : 1940) on a gathering (which I have not seen) from Ala Dag between the Cilician Taurus and Antitaurus. The differences claimed by Boissier (Fl. Or. **4**, 580 : 1879) to distinguish specifically *C. florida* from *C. organifolia* scarcely hold ; the leaves are variable in size, and the length of corolla and filaments is not necessarily constant in a population—indeed Bornmüller (in Beih. Bot. Centr. **31** (2) 284 : 1914) has already noted that the stamens may be exserted or not in Lebanon material of *C. organifolia* s. lato. Even if sex forms do not occur, corolla forms certainly do. In all the Cilician material of *C. florida* that I have seen the stamens are long-exserted, but in this respect there is some variation in my two Isaurian gatherings. In their indumentum, however, the latter (No. 13404 and No. 14144) match perfectly the type of *C. organifolia* var. *velutina* Boiss. from Davros Dag in Pisidia. The indumentum forms in S.W. Anatolia certainly have a geographical basis, but these do not appear to be necessarily correlated with corolla or stamen forms. There is, in fact, such a range of variation in indumentum, number of whorls, length of corolla and filaments, and even in the shape of the calyx, that I believe *C. florida* and *C. labillardieri* must both be included in *C. organifolia* until the types of the last two (in Herb. Delessert) can be examined and the group studied further in the field.

A peculiar feature of *C. organifolia* s. lato (incl. *C. florida*) is the inversion of the corolla ; though the calyx remains upright the corolla tube is twisted through 180°, so that the morphologically posterior lip is anterior in position. Unfortunately examination of dried material has not enabled me to decide whether or not the stamens are declinate, as they are in the resupinate flowers of *Salvia jurisicii* ; in the latter, however, it is the pedicel that is twisted. Nabelek's figure of *C. florida* (as *Satureia*) in Publ. Fac. Sc. Univ. Masaryk, Brünn, No. 70, 43 (1926) shows the inversion of the corolla, although it is not remarked on in the text. A study of herbarium material has shown that the same type of inversion characterises the related species *C. nivea* Boiss. and *C. staminea* Boiss. This form of resupination is very unusual, and might be used as a sectional character. A similar flower-shape is characteristic of *Dicliptera* Juss. and *Peristrophe* Nees in *Acanthaceae*.

C. pamphylica Boiss. et Heldr. ex Benth. in DC., Prodr. **12**, 227 (1848).

Prov. Antalya, distr. Alanya (Isauria-Pamphylia) : Kargi Çay, N.E. of Alanya, near place called Taşatan, Aug. 28, 1947, No. 14420 (*fruct.*)—forma haec indumento breviter velutino (haud villosa) a typo differt.

C. troodi Post in Mem. Herb. Boiss. **18**, 97 (1900).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ above Geyran Yaylâ, 2130 m., limestone scree, fl. violet, Jul. 16, 1947, No. 13381.

Prov. Muğla, distr. Köyceğiz : Sandras Dağ, 2200 m., on serpentine, Jul. 23, 1947, No. 13553 ; *ibid.*, near Gökçe Ova, 1700 m., on serpentine in open *Pinus nigra* subsp. *pallasiana* forest, No. 13499.

This species, related to *C. corsica* Benth. endemic to the mountains of Corsica, has previously only been known from the serpentine peak of Troödos in Cyprus. The Anatolian gatherings differ slightly from Cyprus material in the more prominent nervature on the underside of their usually more pointed leaves, and in their longer calyx teeth. The specimens from the limestone peak of Boz Dağ have longer hairs on the calyces and upper part of the flowering stems than in the Sandras Dağ or Cyprus plants, both of which are found on serpentine. The species is much more abundant on Sandras Dağ than in Cyprus, where the population cannot number more than a few thousand individuals. Nevertheless, the small Cyprus population is not a very homogenous one, particularly in its floral characters : the calyx teeth are sometimes as long as those of the Anatolian plant, and the corolla varies considerably in length (from 13 mm. to 18 mm.)—the latter possibly due to gynodioecism. *C. corsica* shows a similar variation.

Both *C. troodi* and *C. corsica* may well have been derived from the widespread and polymorphic *C. alpina* L. ; Cretan material of the latter species, referred to *C. alpina* L. subsp. *aetnensis* (Strobl.) Rech. fil., Fl. Aegaea, 528 1943, shows a marked similarity in habit to *C. corsica* and *C. troodi*. *C. alpina* has apparently not been recorded from the Taurus, although it occurs (as var. *anatolica* Bornm.) in Lydia.

C. vulgaris (L.) Druce in Ann. Scot. Nat. Hist. 1906 : 224.

Prov. Ankara (Galatia) : Beynam, 1300 m., by stream, Jul. 5, 1947, No. 13036. Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, between Çukur Yaylâ and Kuzdere, in *Cedretum*, Aug. 15, 1947, No. 14182.

Calamintha sp. nov. ? Sect. *Calamintha* Benth. f. A *C. betulifolia* Boiss. et Bal. foliis minoribus, bracteis lineari-subulatis, floribus dimidio minoribus, calyce ad 1/3-1/4-bilabiato, staminibus anterioribus brevioribus recedit ; a *C. pamphylica* Boiss. et Heldr. indumento brevissime subvelutino, calyce brevior ad 1/3-1/4-bilabiato, tubo corollae multo brevior staminibus anterioribus quam posteriora vix manifeste longioribus differt.

Prov. Antalya, distr. Kemer : Kesme Boğaz near Kemer, 100 m., Aug. 15, 1947, No. 14071. The material is insufficient for a full description.

Dorystaechas hastata Boiss. et Heldr. apud Benth. in DC., Prodr. 12, 261 (1848).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ near Çukur Yaylâ, 1520 m., rocky slopes, Aug. 15, 1947, No. 14188 ; distr. Antalya (Pisidia), at Termessus, shrub 1 m. tall, Aug. 11, 1947 No. 13948.

Dorystaechas is a monotypic genus known only from this corner of Anatolia and is evidently a relict type.

Lamium cymbalariifolium Boiss. Fl. Or. **4**, 759 (1879).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, 2200 m., N. scree, Aug. 16, 1947, No. 14170.

L. eriocephalum Benth. in DC., Prodr. **12**, 506 (1848).

Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2500 m., in steep limestone screes on W. side of summit, scarce, fl. pink, Aug. 31, 1947, No. 14566.

L. garganicum L. subsp. **striatum** (S. et S.) Hayek var. **nepetifolium** (Boiss.) P. H. Davis, comb. nov.—*L. striatum* S. et S. var. *nepetifolium* Boiss., Fl. Or. **4**, 757 (1879).

Prov. Antalya, distr. Alanya (Isauria) : Ak Dağ (S. of Geyik Dağ) 2300 m., near little lake, fl. pink, Aug. 28, 1947, No. 14385.

Lamium sandrasicum P. H. Davis, sp. nov. (Subgen. *Eulamium* Aschers. Sect. *Pollichia* (Willd.) Briq. Subsect. *Garganica* Briq.).

Affinis *L. cymbalariifolio* Boiss. sed foliis majoribus 9-crenatis ciliolatis textura tenuioribus, galea corollae minus profunde biloba divergit. A *L. microphylo* Boiss. dentibus calycis gracilioribus, forma corollae brevioris recedit.

Caudiculi e base perenne lignescente numerosi subterranei inter lapides serpentinos, in caules fragiles procumbentes, 3–10 cm. longos, 1 mm. latos, foliatis abeuntes. *Folia* parva, petiolata, aliquantum purpurascens; lamina orbiculari-reniformis, cordata, 5–11 mm. lata longitudine paulo brevior, textura tenuis, sparse pubescens margine minute ciliata, crenis brevissime oblongis obtusissimis profunde \pm 9-crenata; petiolus gracillimus lamina 3-plo longior. *Verticillastra* 2–3, biflora, dense capitata. *Bractee* anguste lineares, acutae, calyce sub-breviores, ciliolatae. *Calyx* conicus, 10–12 mm. longus, glabrescens, ad medium in dentes gracillimos lanceolato-subulatos \pm breviter ciliatos fissus. *Corolla* 2.8 mm. longa, purpureo-rosea, extus hirta, ad tertiam partem bilabiata, tubo exserto; galea in lacinias duas 2 mm. longas irregulariter bifidas divisa; labium inferius lobo mediano 5–7 mm. lato, 4–5 mm. longo, manifeste retuso, lobis lateralibus valde reductis angulatis minute caudatis. *Nuculae* ignotae. Floret Jul.

Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, 2200 m., rare among serpentine rocks in N. gulley below a snow patch, perennial, flowers purplish pink, Jul. 23, 1947, Davis 13548 (Typus in Herb. Kew.).

This very attractive dwarf species differs from the Lycian *L. cymbalariifolium* Boiss. in the size and form of its thinner leaves whose more numerous crenations are shortly oblong and very obtuse; the hood of the corolla is less deeply lobed. Its leaves resemble those of *L. microphyllum* Boiss. (from Cadmus in Caria) but it can be distinguished from that species by its more slender calyx teeth and shorter corolla of different shape.

Lamium sp. nov. ? (Subgen. *Eulamium* Aschers. Sect. *Pollichia* (Willd.) Briq. Subsect. *Garganica* Briq.). A *L. cymbalariifolio* Boiss. foliis majoribus petiolo quam lamina integra vel 3–5-crenata 1–1½-plo longiore, dentibus

calycis brevioribus latioribus differt. A *L. microphylo* Boiss. foliorum crassiorum glabrorum forma dissimili, corolla minore recedit. A *L. sandrasico* P. H. Davis foliorum glabrorum forma et calycibus divergit.

Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, above Ağla, 1360 m., among serpentine rocks in *Pinus nigra* subsp. *pallasiana* zone, Jul. 25, 1947, No. 13597.

The brief diagnosis refers to an apparently new species collected on the same mountain as *L. sandrasicum* P. H. Davis but at a lower elevation. Unfortunately the limited material is incomplete ; only one withered corolla was available for study. The calyx, in fruit 13 mm. long, is divided to 1/3 into triangular acute (scarcely acuminate) ciliate teeth. The hood of the corolla appears to be deeply bifid.

Lycopus europaeus L., Sp. Pl. 21 (1753).

Prov. Antalya, distr. Elmali (Lycia) : Kara Göl, near Yuva, 1000 m., marshy field, fl. white, Aug. 7, 1947, No. 13913.

Marrubium astracanicum Jacq., Ic. Pl. Rar. 1, 11 (1781 -86).

Prov. Konya, distr. Bozkir (Isauria) : near Sau'cak Yaylâ between Geyik Dağ and Bozkir, 2000 m., fl. purple, Sept. 2, 1947, No. 14580.

Marrubium bourgaei Boiss. subsp. **caricum** P. H. Davis, subsp. nov.

A typo caulibus elatioribus, eis turionum sterilius albo-tomentosis, indumento pilis valde inaequaliter stellatis composito, foliis caulinis orbiculari-obovatis superne subsericeis, verticillastris floribusque submajoribus, calycibus et bracteis minus plumosis, dentibus calycis conspicue inaequalibus paulo robustioribus divergit.

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, c. 2100 m., in calc. scree near the summit. Jul. 16, 1947, Davis 13402 (Typus in Herb. Kew.).

The following forms of *M. bourgaei* Boiss., differing slightly from Boissier's type, have been collected :—

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, 2100 m., flowers white, Aug. 16, 1947, No. 14195—forma haec floribus minoribus, bracteis et calycibus minus plumosis, dentibus calycis brevioribus a typo paulo differt. Prov. Muğla, distr. Fethiye : Girdev Dağ (Eren Dağ), 2400 m., Aug. 5, 1947, No. 14018—forma haec secunda indumento densiore aureo, foliis valde nervosis bullatis, floralibus brevissime pedunculatis a typo recedit.

The status of subsp. *caricum* is subject to revision, the relationships of these alpine *Marrubia* (Sect. *Marrubium* Benth. Subsect. *Quinquident.* Briq.) from the Near East being obscure with the material at present available. Local populations appear relatively uniform, but recent gatherings from Anatolia make it increasingly difficult to demarcate some of the species cited by Boissier in *Flora Orientalis*. The related genus *Sideritis* shows a similar complexity of geographical microspecies.

The two Lycian gatherings (14018, 14195) which I have referred to *M. bourgaei* Boiss. (typically a Lycian species but closely related to *M. heterodon* Boiss. et Bal. from Cilicia) differ considerably from the type and evidently represent local races. In the case of No. 14018 it is interesting

to note the variation in length of the calyx teeth (usually considered a good specific character), one form having very unequal slender teeth, and the other much shorter ones, of more or less equal length, recalling those of *M. libanoticum* Boiss. More collecting must be done in Asia Minor before a revision can be satisfactorily undertaken and the relationships of both Balkan and Anatolian forms require careful investigation. *M. bourgaei* subsp. *caricum* certainly shows an affinity with *M. thessalum* Boiss. et Heldr. from Thessalian Olympus.

M. micranthum Boiss. et Heldr. *apud Benth.* in DC., Prodr. **12**, 449 (1848).

Prov. Antalya, distr. Alanya (Isauria) : Ak Dağ (S. of Geyik Dağ) 2300 m., fl. white, Aug. 28, 1947, No. 14370. The dominant plant on the mountainside, growing with *Euphorbia kotschyana* Fenzl.

M. parviflorum Fischer et Meyer, Ind. Petrop. **1**, 33 (1835).

Prov. Ankara (Galatia) : Beynam, in fallow fields.

M. vulgare L. var. ***lanata*** Benth., Lab. Gen. et Sp. 591 (1834).

Prov. Muğla, distr. Köceğiz (Caria) : Dalaman, Jul. 26, 1947, No. 13570.

Melissa officinalis L. Sp. Pl. 592 (1753).

Prov. Muğla, distr. Köyceğiz : near Ağla on Sandras Dağ, shady banks, Jul. 25, 1947, No. 13585. Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ at Kuzdere, 900 m., plant smelling of ripe apples, fl. creamy yellow, Aug. 15, 1947, No. 14083 & 14087 ; distr. Alanya (Pamphylia—Isauria) : between Kargı Çay and Belister (N.E. of Alanya), 1100 m., on bank of dried-up stream, Aug. 26, 1947, No. 14236.

Mentha—species not yet determined.

Micromeria carica P. H. Davis in Kew Bull. 1948, (4) : 1949.

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ above Geyran Yayla, on outcropping limestone rocks in *Pinus nigra* subsp. *pallasiana* forest, fl. mauve, Jul. 16, 1947, No. 13422.

This distinctive species in Sect. *Pseudomelissa* Benth. is related to *M. taygetea* P. H. Davis from the Peloponnesus.

Micromeria carminea P. H. Davis, sp. nov. (Sect. *Piperella* Benth.)

A *M. graeca* (L.) Benth. sensu lato caulibus valde abbreviatis internodiis quam folia multo brevioribus, verticillastris approximatis, tubo calycis longiori removitur. A *M. elliptica* (C. Koch) Boiss. statura nana, indumento breviter tomentoso, foliis valde approximatis, cymis in racemos compactiores dispositis, dentibus calycis gracilioribus lanceolato-subulatis manifeste ciliatis divergit. A *M. croatica* (Pers.) Schott caulibus pumilis foliis lanceolato-ellipticis breviter tomentosis margine revolutis, calyce ad 1/4–1/3 in dentes breviores fisso recedit.

Planta perennis, humilis, saxatilis. *Caules* e base lignoso tortuoso numerosi, ascendentes, 4–6 cm. alti, 0.5 mm. lati, breviter hirsuti, superne crebre foliati. *Folia* lanceolato-elliptica, subsessilia, margine revoluta, pilis subadpressis breviter tomentosa, canescentia, 5–9 mm. longa, 1.5–2.5 mm. lata, valde approximata, internodiis multo longiora,

nervo mediano subtus prominenti, inferiora diminuta, infima decidua. *Cymae* 1-3-florae in axillas foliorum summorum dispositae, breviter pedunculatae, racemum densum, 1-2 cm. longum, 1-1.3 cm. latum, formantes. *Bractee* angustissime lanceolatae, 1.5-2 mm. longae, pedicellis saepe paulo breviores. *Calyx* tubulosus, 5 mm. longus, tubo 1 mm. lato, breviter piloso-hirsutus, sub-bilabiatus, fauce albo-barbatulus, ad tertiam vel quartam partem in dentes lanceolato-subulatos manifeste ciliatos fissus; dentes inferiores bini, 2 mm. longi, superioribus tribus tenuioribus paulo longiores. *Corolla* 10-11 mm. longa, carminea, tubo exserto superne dilatato piloso; labium superius 3.5 mm. longum, 2.5 mm. latum, obtusissimum, retusum; labium inferius 5 mm. longum et latum, in lobos laterales obtusissimos et lobum medianum orbicularem paulo longius trifidum. *Stamina* posteriora 1.25 mm. longa, anteriora 2.75 mm. longa, lobis antherarum valde divergentibus. *Stylus* 19-20 mm. longus, in ramos vix 1 mm. longos divisus. *Nuculae* ignotae. Floret Jul.

Prov. Denizli, distr. Acipayam (Caria): Boz Dağ above Geyran Yaylâ, 1800-1900 m., in crevices of limestone rocks with *Globularia dumulosa*, flowers almost pure carmine, Jul. 16, 1947, Davis 13403 (Typus in Herb. Kew.).

I have not been able to decide on a precise affinity for this attractive new species. From the polymorphic *M. graeca* (L.) Benth. *sensu lato* it can be distinguished by its very short stems, crowded overlapping leaves, close whorls, and calyces which have, relative to the length of their teeth, a longer tube; in its grey canescent indumentum it approaches *M. graeca* var. *villicaulis* Borb., but in its large flowers it resembles var. *longiflora* Guss. (*Satureia consentina* Ten.) which may have the lower calyx teeth longer than the upper ones—a feature of *M. carminea*. The new species also shows affinities with the N. Balkan *M. croatica* (Pers.) Schott, and with *M. elliptica* (C. Koch) Boiss. from Turkish Armenia.

M. carminea is a local species on Carian Boz Dağ, growing in crevices of limestone rock near the upper limit of the *Pinus nigra* subsp. *pallasiana* forest; it often accompanies *Globularia dumulosa* O. Schwarz—a relict species related to *G. stygia* Orph. from the Styx gorge in the Peloponnesus.

M. cristata Hoppe, Gris., Spic. Fl. Rum. et Bithyn. 2, 122 (1844).

Prov. Muğla, distr. Fethiye (Lycia): Girdev (Eren) Dağ above Duğer, 1600 m., in crevices of shady limestone rocks sloping at 50°-70°, fl. very pale mauve with darker spots on lower lip, Aug. 6, 1947, No. 13813.

M. graeca (L.) Benth., Lab. Gen. et Sp. 373 (1834).

Prov. Antalya, distr. Kemer (Lycia): Kesme Boğaz near Kemer, 60 m., Aug. 15, 1947, No. 14070.

M. juliana (L.) Benth., Lab. Gen. et Sp. 373 (1834).

Prov. Antalya, distr. Elmali (Lycia): Yuva, 1100 m., rocky S. slope, fl. mauve, Aug. 7, 1947, No. 13728.

var. **myrtifolia** (Boiss. et Hohen.) Boiss., Fl. Or. 4, 570 (1879).

Prov. Antalya, distr. Alanya (Pamphylia-Isauria): Kargi Çay near Kozlu Dere (N.E. of Alanya) 1000 m., Aug. 26, 1947, No. 14275.

M. juliana and its allies certainly require thorough revision ; intermediates occur between *M. juliana* var. *myrtifolia* (*M. myrtifolia* Boiss. et Hohen.) and the type, and even *M. graeca* is frequently hard to separate from *M. juliana* as delimited by Bentham (*l.c.*).

Nepeta cadmea Boiss., Diagn. Pl. Or. Ser. I, 5, 63 (1844).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ near Geyran Yaylâ, in *Pinus nigra* subsp. *pallasiana* forest, fl. white, Jul. 16, 1947, No. 13335.

I very much doubt if *N. cadmea* should be kept specifically distinct from *N. italica* L. Intermediates occur between these two plants, and also, in the Cilician Taurus and Aintab region, between *N. italica* and *N. leucostegia* Boiss. et Heldr. Nevertheless, reduction of *N. cadmea* and *N. leucostegia* to subspecific rank is not advisable until the Balkan species related to *N. italica* have been further studied.

The following gathering is intermediate between *N. cadmea* and *N. italica* :—Prov. Denizli (Caria) : Taş Ocağı near Denizli, 600 m., fl. white, Jul. 13, 1947, No. 13257.

N. cataria L., Sp. Pl. 570 (1753).

Prov. Ankara (Galatia) : Hacikadun valley near Kecioren, perennial, fl. white, Jul. 9, 1947, No. 13181.

N. cilicia Boiss. ex Benth. in DC., Prodr. 12, 388 (1848).

Prov. Denizli, distr. Acipayam : Boz Dağ above Geyran Yaylâ, 1500–1670 m., in zone of *Pinus nigra* subsp. *pallasiana*, Jul. 16, 1947, No. 13420 ; *ibid.*, 13436 ; *ibid.*, 13392. Flowers violet, nutlets tuberculate.

Although Boissier and later authors have taken up the name *N. cilicia*, the species was originally described as *N. cilicia*, so that the latter epithet (which is not orthographically incorrect) should be retained.

N. concolor Boiss. et Heldr. ex Benth. in DC., Prodr. 12, 386 (1848).

Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2590 m., in very exposed rocks on N. side of peak, Aug. 31, 1947, No. 14565 ; *ibid.*, 2130 m., in rocks on E. side, fl. violet-blue, No. 14554.

The strongly tuberculate nutlets (No. 14554) have a slightly pilose apex ; the stems in both gatherings are somewhat scabrid, not smooth as in Heldreich's from the same mountain.

N. pannonica L., Sp. Pl. 570 (1753) aff. var. **parviflorae** (Benth.) Hayek, Prodr. Fl. Balc. 2, 261 (1929).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ near Geyran Yaylâ, 1370 m., fl. white, Jul. 16, 1947, No. 13342 ; *ibid.*, above Geyran Yaylâ, 2280 m., fl. very pale mauve, No. 13416.

Nepeta pilinux P. H. Davis, sp. nov. (Sect. *Eunepeta* Boiss. inter Subsect. *Macrostegias* Boiss. et Subsect. *Stenostegias* Boiss.).

Affinis *N. camphoratae* Boiss. et Heldr. sed foliis vix cordatis, bracteis elliptico-lanceolatis membranaceo-marginatis, dentibus calycis plerumque latioribus, nuculis superne pilosulis recedit. A *N. parnassica* Heldr. et

Sartor foliis vix cordatis, verticillastris remotis, bracteis brevius acumina-tis, floribus minoribus, dentibus calycis brevioribus, nuculis in parte superiore pilosulis facile distinguenda.

Planta perennis, basi suffrutescens, ligno tortuoso. *Caules* numerosi, erecti, 20–50 cm. alti, 2 mm. lati, simplices vel parce ramosi, quad-ranguli, pilis patentibus glanduloso-pubescentes, virescentes. *Folia* petiolata, glanduloso-pubescentia, virescentia; lamina ovato-triangularis, basi abrupte truncata vel etiam paulo subcordata, obtuse crenato-dentata, 1.5–2.5 cm. longa, 0.8–1.8 cm. lata, petiolo saltem 3–4-plo longior; folia floralia subsessilia, summa diminuta bracteiformia. *Verticillastria* 5–10, inferiora valde distantia internodiis 2–5 cm. longis, superiora subapproximata, 1–2 cm. lata, c cymis breviter pedunculatis congestis composita, spicam 15–20 cm. longam interruptam formantia. *Bractee* elliptico-lanceolatae, anguste membranaceo-marginatae, ciliatae glanduloso-pubescentes, breviter acuminatae, dimidium vel duas partes calycis aequantes. *Calyx* 6–7 mm. longus, 13-nervius, fauce subobliquus nudus, extus breviter glanduloso-pubescent, ad partem quartam vel tertiam in dentes triangulari-lanceolatos plerumque acuminatos angustissime membranaceo-marginatos vix patentes fissus. *Corolla* 11 mm. longa, albida vel pallidissime lilacina, tubo curvato 6–7 mm. longo e tubo calycis subexserto; labium superius 4.5–5 mm. longum in lobos late ovatos obtusos profunde bifidum; labium inferius 6.5 mm. longum, valde divaricatum, lobo mediano 4 mm. longo, 6 mm. lato, vix bilobato irregulariter crenato purpureo-punctato sinu 1 mm. lato, lobis lateralibus brevibus rotundatis. *Stamina* 4 mm. longa, lobis antherarum divergentibus. *Stylus* 10 mm. longus, in ramos vix 1 mm. longos reflexos bifidus. *Nuculae* ovato-ellipticae, 2 mm. longae, 1 mm. latae, fuscae, minute tuber-culatae, superne pilis albis brevissime pilosulae. Floret Aug.–Sept.

Prov. Antalya, distr. Alanya (Isauria): Ak Dağ (S. of Geyik Dağ) above Gozu Buyuk Yayla, c. 2400 m., in gullies on N. limestone cliffs, flowers whitish or very pale lilac, Aug. 28, 1947, Davis 14329 (Typus in Herb. Kew; *ibid.*, c. 2300 m., in rocks and scree by little lake on N.W. face of the mountain, Aug. 28, 1947, No. 14379; Geyik Dağ, on N. side of summit, c. 2400 m., on exposed rock-ledge, Aug. 31, 1947, No. 14572 (*forma*).

N. pilinix belongs to that complex of species arbitrarily divided by Boissier (Fl. Or. 4, 638, into subsections *Macrostegiae* and *Stenostegiae* of Sect. *Eunepeta*: these two subsections are distinguished from each other by the width of the bracts—a character which, like the length of those organs, shows considerable intraspecific variation. Despite its relatively broad bracts (as in Subsect. *Macrostegiae*, the new species seems to show the closest affinity with *N. camphorata* Boiss. et Heldr. (endemic to Taygetus in the Peloponnesus) in Subsect. *Stenostegiae*. *N. camphorata* Boiss. et Heldr. is closely related to *N. heldreichii* (also from Taygetus), *N. sprunerii* Boiss. and *N. parnassica* Heldr. et Sart., all Balkan plants in the same subsection. *N. pilinix* also show affinities with *N. leucostegia* Boiss. et Heldr. (from Anatolia and Syria) placed by Boissier (*l.c.*) at the end of Subsect. *Macrostegiae*; it is easily distinguished from that plant by its glandular pubescence, shorter bracts with narrower membranous margins, shorter calyx teeth, and hairy nutlets—like those of *N. pannonica* L. The specific name refers to the latter feature.

I have not seen specimens of *N. isaurica* Boiss. et Heldr., discovered by Heldreich at lower elevations on Gheidagh (Geyik Dağ) than those favoured by *N. pilinux*, but the former seems well distinguished from the new species by its dwarf habit, very shortly velutinous indumentum, small leaves, and linear-subulate bracts.

The Geyik Dağ gathering of *N. pilinux* (No. 14572), differs from the Ak Dağ material in its lower stature, very shortly petiolate leaves of thicker texture, and shorter calyx teeth and bracts; it was growing in a very exposed place and had evidently been grazed. The description covers all the material collected.

Nepeta sp. nov. (Sect. *Eunepeta* Boiss. Subsect. *Stenostegiae* Boiss.).

Prov. Antalya, distr. Kemer (Lycia): Kesme Boğaz near Kemer, 60–100 m., rocky slope, Aug. 14, 1947, No. 14052 (*fruct.*). The plant is being cultivated before a description is drawn up.

Origanum L., Gen. Pl. ed. 5, 256 (1754).

I cannot follow Briquet (in Engler & Prantl, *Pflanzenf.* **4**, (3a) 304–309: 1897) in considering *Majorana* Moench and *Amaracus* Gled. as genera distinct from *Origanum* L. Briquet's main reasons for separating *Amaracus* were that in this group the stamens are stated to ascend under the upper corolla-lip (instead of stretching straight out as they do in *Origanum sensu stricto* and *Majorana*) and the calyx is 2-lipped (instead of regularly 5-toothed as in *Origanum s. stricto*). Owing to this staminal character Briquet placed *Amaracus* in Tribus *Stachyoidea* Subtribus *Melissinae*, and *Origanum s. stricto* and *Majorana* in Subtribus *Thyminae*. In so doing he was consistent within his scheme of Labiate classification; but over-emphasis on andraecial and calycine differences has led to an unnatural generic separation of the three groups; the similarities between them were not given due weight. I very much doubt if the stamens do in all cases ascend under the upper lip of the corolla in *Amaracus*; it can hardly be the case in *O. (Amaracus) amanum* Post in which the anthers are practically sessile, and in *O. (Amaracus) wetteri* Barbey et Briq. and *O. (Amaracus) lirium* Heldr. the stamens appear to stick straight out. The specific nature of the latter plant, however, is perhaps open to question (*vide infra*). Although species of *Amaracus* are usually distinguished from *Origanum s. stricto* by a rather characteristic facies, *O. (Amaracus) leptocladius* Boiss. is remarkably similar in habit to *O. laevigatum* Boiss.

Majorana, however, has neither facies nor andraecial distinction to separate it from *Origanum s. stricto*, the only significant difference being in the calyx; the latter has an oblique throat in *Majorana* and, when split to the base anteriorly, has an entire upper lip. In *O. (Majorana) micrantha* Vogel and its allies, however, the calyx is 2-lipped, the upper lip being 3-toothed and the lower bifid. There is in fact such a diversity of calyx shape found in *Majorana*, paralleled by scarcely less in *Amaracus*, that one cannot give calycine differences much importance as generic criteria here.

When Briquet wrote his revision (l.c.) only one putative hybrid between the groups in *Origanum s. lato* was known—*O. (Amaracus) lirium* Heldr. from Euboea, believed to be a hybrid between *O. heracleoticum* L.

and *O. scabrum* Boiss. et Heldr. subsp. *pulchrum* (Boiss. et Heldr.) Davis.* Dr. K. H. Rechinger has collected this plant in its *locus classicus* and is certain that it represents a "good" species (Rech. fil., Fl. Aegaea, 531: 1943). I have, however, collected on Taygetus a plant that is certainly conspecific with the Euboean *O. lirim*; it was growing with *O. scabrum* Boiss. et Heldr. subsp. *eu-scabrum* (Hayek) Davis†, and in the field I believed it to be a hybrid between the latter and *O. heracleoticum*. Taygetus and Euboea are the only localities where *O. scabrum* s. lato is found, the two geographically isolated subspecies being morphologically very close to one another (see A. K. Jackson in Hook. Ic. Pl. 34, t. 3302: 1936). It therefore seems probable that, even if *O. lirim* is not a true hybrid between *O. heracleoticum* and *O. scabrum* s. lato, it is a species that has arisen from a hybrid between those two species: it is morphologically intermediate between them. Unfortunately the cytology of the genus—even of our native Marjoram—is apparently uninvestigated.

I list here the six authentic hybrids known between *Origanum* s. *stricto*, *Amaracus* and *Majorana*, three of which I have collected myself:—

- O. heracleoticum* L. × *O. (Majorana) maru* L. (v.v.).—*Majorana leptoclados* Rech. fil., Neue Beiträge zur Flora von Kreta, 125 (Wien, 1943). Grana pollinis ut videtur abortiva!
- O. ehrenbergii* Boiss. × *O. (Majorana) syriacum* L.—× *O. barbarae* Bornm. in Verh. Zool.-Bot. Ges. Wien, 48, 615 (1898).
- O. laevigatum* Boiss. × *O. (Majorana) syriacum* L.—× *O. symeonis* Mouterde in Ann. Fac. Médec. Beyrouth, 6, (reimp.) 3 (1935).
- O. majorana* L. (*Majorana hortensis*) ♀ × *O. vulgare* L. ♂—× *Origanomajorana applii* Domin in Preslia, 13-15, 197 (1935).—× *Origanum applii* Boros in Bot. Köz. 35, 317 (1938). Hybr. hortensis fertilis.
- O. (Amaracus) sipyleum* L. × *O. (Majorana) onites* L. (v.v.).—× *O. intermedia* P. H. Davis (vide infra). Grana pollinis abortiva!
- O. (Amaracus) libanoticum* Boiss. × *O. (Majorana) syriaca* L. (v.v.).‡—× *O. adonidis* Mouterde in Ann. Fac. Franc. Médec. Beyrouth, 6, (reimp.) 4, (1935).—× *Majoranamaracus zernyi* Rech. fil. in Fedde, Repert., 45, 95 (1938). Stamina absunt!

The above list consists of four hybrids between *Origanum* s. *stricto* and *Majorana*, and two between *Amaracus* and *Majorana*. Unless *O. lirim* be one, there is no hybrid known between *Origanum* s. *stricto* and *Amaracus*, although in facies certain species in these two groups resemble one another more closely than *Majorana* resembles *Amaracus*. The garden hybrid between *O. vulgare* L. and *O. majorana* L. (*Majorana hortensis*) is certainly fertile—F₂ segregation has been described by Appl in Preslia 6, 3,

***Origanum scabrum** Boiss. et Heldr. subsp. **pulchrum** (Boiss. et Heldr.) Davis, comb. nov.—*O. pulchrum* Boiss. et Heldr. in Boiss., Diagn. Pl. Or. Ser. II, 4, 11 (1859).—*Amaracus scaber* (Boiss. et Heldr.) Briq. subsp. **pulchrum** (Boiss. et Heldr.) Hayek, Prodr. Fl. Bale. 2, 332 (1929).

†**Origanum scabrum**. Boiss. et Heldr. in Boiss., Diagn. Pl. Or. Ser. I, 7, 48 (1846) subsp. **eu-scabrum** (Hayek) Davis, comb. rev.—*Amaracus scaber* (Boiss. et Heldr.) Briq. subsp. **eu-scaber** Hayek, Prodr. Fl. Balc. 2, 332 (1929).

‡In my specimens of this hybrid the calyx is divided to the middle into two unequal lips, the upper having three broadly ovate ciliate teeth shorter than those of *O. (Amaracus) libanoticum*. Stamens are entirely absent.

(1928). The calyces of these two species (the second has never been found wild) are as widely different as one can find in *Origanum s. lato*, so that the occurrence of this fertile hybrid is of particular interest. There is no reliable evidence that any of the other authentic hybrids are fertile; nevertheless, Mouterde (*l.c.*) states that $\times O. barbarae$ and $\times O. symeonis$ are locally abundant. Only one wild hybrid is known between species in any one of the three groups— $\times O. font-queri$ Pau (*O. compactum* Benth. $\times O. grossii$ Pau). *O. (Amaracus) hybridum* Miller, however, is most probably a spontaneous garden hybrid between *O. (Amaracus) dictamnus* L. and *O. (Amaracus) sipyleum* L. (see N. E. Brown in Gard. Chron. Ser III, 3, 232 : 1888); it is a vigorous plant, but apparently sterile, being propagated in cultivation by cuttings and division.

If the three groups were to be treated as separate genera we should be faced with at least six inter-generic hybrids (one of which is certainly fertile) and probably only two inter-specific ones. How much importance should be given to such hybridisation as a generic or specific criterion is debatable, but there can be no doubt that the existence of these hybrids indicates a very close relationship between the three groups and, in view of the strong morphological similarities between them, I consider generic separation unjustified. Taken together, they form a very natural group.

Intergeneric hybrids, it should be mentioned, are very rare in *Labiatae*—Briquet (*l.c.*) cites only *Ramona stachyoides* \times *Salvia columbariae*.

Boissier's classification of *Origanum s. lato* (Boiss., Fl. Or. 4, 546 : 1879) seems the most natural so far attempted, but I consider it doubtful whether equal sectional rank should be accorded to *Amaracus*, *Origanum s. stricto* and *Majorana*. The last two groups, despite calyx differences, resemble one another more closely than *Amaracus* resembles *Origanum* or *Majorana*.

The "parallel development" between *Origanum* Sect. *Amaracus* and *Thymus* Sect. *Pseudothymbra* is interesting; both possess enlarged coloured bracts and an elongated corolla tube. Although purple is the usual colour that suffuses the bracts in both genera, white-bracted species also occur. A hybrid (\times *Thymus paradoxus* Rouy) is known between species in *Thymus* Sect. *Pseudothymbra* Benth. and Sect. *Serpyllum* Benth. Subsect. *Vulgares* Briq.

Origanum bilgeri P. H. Davis, sp. nov. (Sect. *Majorana* (Moench) Vogel).

Ab *O. micrantho* Vogel indumento patentiore, foliis amplioribus, spicastris saepe oblongis, floribus majoribus, calyce turbinato-campanulato, labiis aequilongis, dentibus labii anterioris plerumque mucronulatis, tubo corollae graciliore recedit.

Caules e base lignosa contorta erecti, 15-30 cm. alti, 1 mm. lati, pilis patentibus 1 mm. longis tomentosi, prope basin gemmis albo-tomentosis praediti, in parte superiore oblongo-paniculati. *Folia* caulium floriferorum orbiculari-ovata, obtusa, brevipetiolata, 1.2-2 cm. longa, 0.8-1.3 cm. lata, glandulis sessilibus haud conspicuis, pilis subpatentibus griseo-tomentosa, superiora subsessilia diminuta. *Spicastra* suboblonga, 0.5-1.5 cm. longa, 0.4 cm. lata, densa vel subinterrupta, in ramulos

corymboso-ramosos in axillis foliorum superiorum disposita. *Bractee* obovatae, \pm adpressae, calyces suboccultantes, inferiores calycibus paulo longiores, superiores sub-breviores, tomentosulae, ciliatae. Flores gynodioici. *Calyx* 3 mm. longus, turbinato-campanulatus, ad quadrantem bilabiatus, extus hirsutus, ore albo-villosus; labia aequilonga, superius prope ad medium in dentes breviter triangulares trifidum, inferius ad basin in dentes triangulares plerumque mucronulatos bifidum. *Corolla* in floribus ♀ 3.5 mm. longa, in ♂ ad 6 mm. longa, tubuloso-infundibularis, alba, hirtula, tubo vix vel paulo exserto; labium inferius superiore emarginato sublongius. *Stamina* inclusa. *Nuculae* late obovatae, laeves, apice obtusissimae, basi acutiusculae. Floret Aug.–Sept.

Prov. Antalya, distr. Alanya (Isauria): Han Boğaz forest near Geyik Dağ, c. 1500 m., in open *Cedretum* on S. side of dry river-bed, flowers white, Aug. 30, 1947, Davis, 14720 (*Typus* in Herb. Kew).

O. bilgeri is undoubtedly closely related to *O. micranthum* Vogel from the Cilician Taurus, from which it can be distinguished by its spreading indumentum, broader leaves, frequently oblong spikes and larger flowers; the calyx is turbinate-campanulate with lips of equal length, the teeth of the lower being somewhat mucronate; the corolla tube is more slender than that of *O. micranthum*. There can be no doubt that the latter species, together with *O. bilgeri* and *O. minutiflorum*, constitutes a link between Sect. *Majorana* and Sect. *Eu-Origanum*. The three species are gynodioecious.

I have named the new Isaurian plant after my friend and botanical assistant in Turkey, Kâmil Bilger of the Y.Z.E., Ankara.

***O. heracleoticum* L., Sp. Pl. 589 (1753).**

Prov. Denizli (Caria): between Denizli and Taş Ocağı, 900 m., fl. whitish, Jul. 13, 1947, No. 13230. Prov. Muğla, distr. Köyceğiz: Sandras Dağ, at Ağla, 600 m., dry banks, Jul. 25, 1947, No. 13589; *ibid.*, near Köklüce, 1520 m., Jul. 23, 1947, No. 13636.

***Origanum hypericifolium* Schwarz et P. H. Davis, sp. nov. (Sect. *Amaracus* (Gled.) Benth. emend. Boiss.).**

Species affinis *O. sipyleo* L. sed foliis turionum sterilium haud sericeis foliis caulium floriferorum conspicue glanduloso-punctatis superne vix glaucis margine scabris, caulibus haud eximie paniculatis, bracteis acuminatis recedit. Ab *O. libanotico* Boiss. foliis \pm acutis, bracteis gracilioribus, calyce dentibus labii superioris triangularibus lanceolatis discrepat.

Caules e base lignescente numerosi, erecti, graciles, c. 40 cm. alti, in parte superiore glabri subpaniculati, inferiore hirtuli. *Folia* manifeste glanduloso-punctata, ovata, plerumque \pm acuta, breviter petiolata ea turionum sterilium juvenilium scabro-hirsuta, ea caulium floriferorum (margine scabro excluso) glabra, ad 1.5 cm. longa et 1 cm. lata, superne virescentia, inferne glaucescentia. *Spicae* 5–11, pauciflorae, orbiculari-ovatae, 1–1.5 cm. longae, singulae in pedunculis binis 0.5–2 cm. longis saepe \pm secundis reflexis in axillis foliorum summorum remote dispositae. *Bractee* orbiculari-ellipticae, acuminatae, glabrae, ad 9 mm. longae et

6 mm. latae, purpurascens. *Calyx* 5-6 mm. longus, glabrescens, glanduloso punctatus, fauce annulo hirto munitus, ad 2/5-bilabiatus ; labium superius ad tertiam partem vel dimidium in dentes tres triangulares vel lanceolatos acutos 0.5-1 mm. longos trifidum ; inferius breve ad basin in dentes duos triangulares 0.25-0.75 mm. longos divisum. *Corolla* 9 mm. longa, sparsim pubescens, rosea, tubo haud gibboso, labio superiore quam inferius sublongiore. *Stamina* breviter exserta. *Nux* ignota. Floret Jul.

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ above Geyran Yaylâ, abundant in rocky limestone places in Black Pine forest, flowers pink, Jul. 16, 1947, Davis 13401 (Typus in Herb. Kew.). Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ above Ağla, on serpentine, Jul. 25, 1947, Davis, 13599 ; Pirnasdağ near Pirnasköy, in stony pine woods on calc. soil (*Pinus nigra* subsp. *pallasiana*) c. 1300 m., Aug. 5, 1938, Schwarz 443. Cybiratis : near Trimali, Oct. 1842, Forbes.

O. hypericifolium is probably most closely related to *O. sipyleum* L. from S.W. Anatolia. It may be distinguished from that species by its conspicuously glandular-punctate leaves ; these have a scabrid margin, and are glaucous only on the under surface. The less numerous spikes do not form a spreading panicle as in *O. sipyleum* L., but are borne in pairs in the axils of the upper leaves ; the bracts are acuminate. From *O. libanoticum* Boiss. it differs not only in its more acute leaves and narrower bracts, but also in the shape of the calyx teeth.

***O. majoranoides* Willd., Sp. Pl. 3, 137 (1800).**

Prov. Antalya, distr. Alanya (Pamphylia-Isauria) : between Kozlu Dere and Kargi Çay (N.E. of Alanya), 1000 m., Aug. 26, 1947, No. 14247. Indigenous.

Elsewhere the species has been recorded as a wild plant only from Cyprus (Stapf in Bull. Imp. Inst. 11, 50 : 1913).

***Origanum minutiflorum* O. Schwarz et P. H. Davis, sp. nov. (Sect. *Majorana* (Moench) Vogel).**

Species affinis *O. micrantho* Vogel sed foliis angustioribus conspicue glanduloso-punctatis virescentibus, bracteis minoribus ovatis calyces haud occultantibus, calycibus (ut bracteis) manifeste glandulosis diversis.

Planta suffruticosa, cortice ramorum longitudinaliter fisso. *Caules* valde numerosi, erecti, 15-20 cm. alti, ad 1 mm. lati, pilis brevibus curvatis aspero-hirsuti, inferne gemmis albo-sericeis praediti, superne subcorymboso-paniculati. *Folia* caulium floriferorum ovata, petiolata, saepe acutiuscula, ad 1 cm. longa et 0.5 cm. lata, pilis brevibus hamatis aspera, glanduloso-punctata, virescentia, superiora diminuta subsessilia. *Spicastra* numerosa, parva, orbiculari-oblonga, 3-10 mm. longa, densa vel subinterrupta, in ramos corymboso-ramulosos in axillis foliorum summorum disposita. *Bractee* (ut folia caulina) ovatae, subpatentes, calyces haud occultantes, superiores calycibus sub-breviores, inferiores paulo longiores. *Flores* gynodioici. *Calyx* breviter turbinatus, vix 2 mm. longus, ore albo-villosus, extus hirsutus glanduloso-punctatus, ad tertiam vel quartam partem bilabiatus ; labium superius ad medium brevissime tridentatum, inferius superiore sub-brevius ad basin in denticulos duos late

triangulares obtusiusculos bifidum. *Corolla* alba, minuta, in floribus ♀ 2.5 mm. longa, in ♂ 3.5 mm. longa, infundibularis, hirtula, tubo vix exserto; labium superius emarginatum inferiore paulo brevius. *Stamina* inclusa. *Nux* ignota.

Prov. Antalya, distr. Kemer (Lycia): Tahtali Dağ (ancient Solyma) by Çukur Yaylâ above Kemer, c. 1000 m., on rocky limestone slopes with *Ballota cristata*, flowers white, Aug. 15, 1947, Davis, 14185 (Typus in Herb. Kew.).

Like *O. bilgeri* Davis, the new species described above is related to *O. micranthum* Vogel. The leaves, however, are narrower, conspicuously glandular-punctate, and much greener than in that species; the bracts are smaller, ovate, and do not hide the glandular calyces.

***O. onites* L.**, Sp. Pl. 590 (1753).

Prov. Denizli (Caria): Taş Ocağı near Denizli, 900 m., fl. white, Jul. 13, 1947, No. 13259. Prov. Muğla, distr. Fethiye (Lycia): Telmessus, rocky places, Jul. 28, 1947, No. 13705.

***Origanum saccatum* P. H. Davis**, sp. nov. (Sect. *Amaracus* (Gled.) Benth. emend. Boiss.).

Species haec facie et foliis ut in *O. scabro* Boiss. et Heldr., sed ab eo bracteis tenuioribus acuminatis, calycis labio superiore ut in *O. tournefortio* Sibth. integro (vel emarginato) et corollae tubo saccato facile distinguenda. Ab *O. solymico* P. H. Davis caulibus paniculatis, bracteis angustioribus, calycis labio superiore integro (vel emarginato), tubo corollae manifeste gibboso valde recedit.

Caules e base lignosa erecti, 40–80 cm. alti, inferne ad 2.5 mm. lati, hirsuti, superne glabri, paniculati. *Folia* turionum steriliū orbicularia, subcordata, brevipetiolata, hirsuta; folia caulium floriferorum sessilia vel subsessilia, late ovata, cordata = acuta, coriacea, glauca, glanduloso-punctata, 1.5–3.5 cm. longa, 1–2 cm. lata, superficie et margine glabra, superiora diminuta. *Spicae* breviter ovato-oblongae, 1–2 (2.5) cm. longae, in ramulis ramorum binorum in axillis foliorum summorum 1–7-enatae. *Bractae* ellipticae, acuminatae, 0.75–1 cm. longae, 2.5–5 mm. latae, glabrae, purpurascentes. *Calyx* 5 mm. longus, calceolatus, glaber, glanduloso-punctatus, fauce annulo hirtō munitus, prope ad medium bilabiatus; labium superius ovatum integerrimum vel emarginatum, inferius fere obsoletum subretusum. *Corolla* 1 cm. longa (vel paulo ultro) hirtula, rosea, tubo superne breviter saccato. *Stamina* longe exserta. *Nuculae* ignotae. Floret Aug.

Prov. Antalya, distr. Alanya (Pamphylia-Isauria): Kargi Çay near Kozlu Dere (N.E. of Alanya), 1000 m., Aug. 26, 1947, Davis 14276 (Typus in Herb. Kew.); Kargi Çay between Durbanas and Derince Dere, 1000 m., rocky limestone slopes in pine woods, Aug. 24, 1947, No. 14397; between Kizil Alan and Durbanas (N. of Alanya), Aug. 24, 1947, No. 14439.

O. saccatum holds an interesting systematic position. In its facies and leaf-shape it resembles the Greek *O. scabrum* Boiss. et Heldr. but, apart from its narrower acuminate bracts, it differs widely in its calyx (the upper lip being entire and the lower nearly obsolete) and saccate corolla,

both of which recall those of the Aegean *O. tournefortii* Sibth. The latter species, primarily on account of the entire upper lip of the calyx, constituted, with *O. dictamnus* L., the Sect. *Euamaracus* Briq. of *Amaracus* Gleditsch. *O. saccatum* links Briquet's two sections of *Amaracus*, as it combines the calyx of one with the facies of the other. A parallel reduction in calyx form is found in *O. solymicum* Davis where, although the upper lips retains 3 small teeth, the lower lip is almost obsolete.

***O. sipyleum* L.**, Sp. Pl. 589 (1753).

Prov. Denizli (Caria) : Taş Ocağı near Denizli, 1000 m., rocky slopes, fl. pink, leaves glaucous on both sides, Jul. 13, 1947, No. 13256.

***Origanum solymicum* P. H. Davis**, sp. nov. (Sect. *Amaracus* (Gled.) Benth. emend. Boiss.).

Affinis *O. scabro* Boiss. et Heldr., sed spicis oblongis perpaucis, bracteis gracilioribus acuminatis, calycis labio inferiore fere obsolete subretuso discrepat. Ab *O. saccato* P. H. Davis caulibus vix paniculatis, spicis paucis, bracteis latioribus, calycis labio superiore tridentato, tubo corollae vix gibboso valde divergit.

Caules erecti, graciles, 30–50 cm. alti, glabri, simplices. *Folia* turionum steriliū hirsutorum orbicularia, infra purpurascētia, margine et nervo mediano ciliata; folia caulium floriferorum orbiculari-ovata, basi cordata, subsessilia, coriacea, glauca, glanduloso-punctata, glabra, margine laeva vel scabra vel etiam subciliata, inferiora \pm obtusa ad 2 cm. longa et lata, superiora minora remota. *Spicae* 1–3 (5), oblongae, 1–4 cm. longae, in pedunculos manifeste divaricatos in axillis foliorum summorum dispositae. *Bractae* obovato-ellipticae, acuminatae, glabrae, pallide viridi-purpurascētes, 9–12 mm. longae, 5–7 mm. latae. *Calyx* 5–6 mm. longus, prope ad medium bilabiatu; labium superius ad quartam vel tertiam partem in dentes triangulares minus 1 mm. longos trifidus; inferius fere obsoletum, subretusum. *Corolla* 12 mm. longa, glabrescens, rosea, tubo exserto superne vix gibboso. *Stamina* longe exserta. *Nuces* 1.25 mm. longae, late ovatae, brunneae, obtusissimae. Floret Jul.–Aug.

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ (ancient Solyma) between Kuzdere and Kesme Boğaz, in rocky calc. *Pinetum brutiae*, flowers pink, Aug. 15, 1947, Davis 14078 (Typus in Herb. Kew.) ; Kesme Boğaz near Kemer, 60 m., in river bed (young plants in a sheltered position), Aug. 17, 1947, No. 14099.

O. solymicum differs from the Greek *O. scabrum* Boiss. et Heldr. by its simple or much less branched inflorescence, oblong spikes, more slender acuminate bracts, and by the almost obsolete teeth of the lower calyx lip. From *O. saccatum* P. H. Davis it is readily distinguished by its simpler inflorescence, broader bracts, tridentate upper lip of the calyx, and almost sackless corolla tube.

The specific name of the new species refers to the classical name for Tahtali Dağ : Solyma.

***Origanum* (Sect. *Amaracus*) *sipyleum* L. \times *Ö.* (Sect. *Majorana*) *onites* L.— \times *O. intermedia* P. H. Davis**, hybr. nov.

Ab *O. sipylea* L. caulibus hirtulis, foliis hirsutis haud glaucis, margine remote serratis, spicis tenuioribus, bracteis minoribus glanduloso-pubescentibus obtusissimis viridibus, calyce calceolato antice ad medium fisso labio inferiore obsoleto (labio superiore breviter tridentata), corollae labio superiore profunde bilobo differt. Ab *O. onites* L. spicis majoribus binis in axillas foliorum summorum (haud in corymbos) dispositis, bracteis majoribus, calyce antice ad medium fisso fauce piloso-annulato, corolla multo graciliore rosea lobulis tenuioribus discrepat. Grana pollinis abortiva. Floret Jul.

Prov. Denizli (Caria) : Taş Ocağı near Denizli, c. 600 m., one plant growing between the parents, flowers raspberry-pink, Jul. 13, 1947, Davis 13260.

This is the second hybrid recorded between *Origanum* Sect. *Amaracus* and Sect. *Majorana*. The pollen grains are abortive.

Phlomis armeniaca Willd., Sp. Pl. **3**, 119 (1800).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, 2130 m., limestone scree, herbaceous, Jul. 16, 1947, No. 13371. Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ at Gökce Ova, 1700 m., on serpentine, Jul. 23, 1947, No. 13518 ; distr. Fethiye (Lycia), Girdev Dağ, Jul. 5, 1947, No. 13840 ; *ibid.*, above Bel Yaylâ, 2200 m., Jul. 6, 1947, No. 13973.—det. Rech. fil.

P. carica Rech. fil. in Oest. Bot. Zeitschr. **89** (4) 273 (1940).

Prov. Denizli (Caria) : between Denizli and Taş Ocağı, 600 m., Jul. 13, 1947, No. 13232.—det. Rech. fil.

P. chimerae de Boissieu in Bul. Soc. Bot. France, **43**, 290 (1896).

Prov. Antalya, distr. Kemer : Kesme Boğaz at foot of Tahtali Dağ, 60–100 m., rare by pathside in *Pinetum brutiae*, shrub 1.5–2 m. tall, Aug. 15, 1947, No. 14056.—det. e. descript.

As specimens of this species were not seen by Vierhapper when he revised Subsect. *Dendrophlomis* in Oest. Bot. Zeitschr. **65**, 225: 1915), he did not place it in his key. De Boissieu related *P. chimerae* to *P. viscosa* Poiret, but the former, though it belongs to the Mediterranean element, certainly appears to be most nearly related to the Irano-Turanian *P. elliptica* Benth. from S. Persia. *P. chimerae* differs from the Persian plant in its taller habit, bracts with a long mucro, longer calycine teeth, and yellow corolla which has a broadly orbicular (not triangular) lower lip ; the flowers of *P. elliptica* are purple. *P. chimerae* was originally described from Chiralu, S. of Kemer, the specific name referring to the jet of inflammable gas famous as the *Chimaera* of the ancients—that burns perpetually in that locality. Another gathering (Atbüki, between Antalya and Finike, 10 m., May 7, 1936, Tengwall 535) must also be referred to this little-known and very distinctive Lycian endemic.

P. fruticosa L., Sp. Pl. 584 (1753).

Prov. Antalya, distr. Alanya (Pamphylia) : Alanya, 70 m., Jul. 23, 1947, No. 14491.

P. grandiflora H. S. Thompson in Ann. Bot. (London) **19**, 441 (1905).

Prov. Muğla, distr. Fethiye (Lycia) : Baba Dağ at Akbel Yaylâ,

1220 m., shrub 1·3 m. tall, Jul. 30, 1947, No. 13693. Prov. Antalya, distr. Kemer : Tahtali Dağ near Kuzdere, 1000 m., in maquis, Aug. 15, 1947, No. 14205.

P. herba-venti L., Sp. Pl. 586 (1753).

Prov. Ankara (Galatia) : Beynam, 1200 m., fallow fields, Jul. 5, 1947, No. 13003.

P. linearis Boiss. et Bal. subsp. **anticragi** P. H. Davis, subsp. nov.

A typo indumento valde cano, petiolis longioribus, lamina latiore et brevioris basi late cuneata, calycibus breviter plumosis removitur.

Caules humiles, 20–30 (35) cm. alti, inferne 2 mm. crassi, plures, simplices, flexuosi, ascendentes vel erecti, pilis stellatis albidis brevibus appresso-tomentosi. *Folia* ut caules pilis stellatis appresse et breviter tomentosa, supra virescenti-canescientia, subtus pallide canescientia; basalia longe petiolata; lamina anguste oblonga, obscure crenata, 4–5 cm. longa, 1–1·3 cm. lata, obtusa, basi late cuneata, petiolo 4–6 cm. longo sub-brevior; caulina minus breviter petiolata internodiis ± aequilonga, lamina lanceolato-oblonga obtusa basi abrupte cuneata, 3·5–5 cm. longa, petiolo 1·3 cm. longo. *Folia floralia* caulinis simillima sed magis breviter petiolata. Verticillastra 2–4. *Bracteae* flaccidae, lineares, 4–8 mm. longae, 1/3–1/2-calycem aequantes. *Calyx* 12–15 mm. longus, ± tubiformis, superne in fructum plerumque paulo constrictus, ob pilos valde inaequaliter stellatos 1–1·5 mm. longos plumoso-tomentosus itaque ambitu oblongo-ovatus; dentes 3–5 mm. longi. subinaequales, e base deltoidea abrupte subulati. *Corolla* 2·5 cm. longa; labium inferius superiore 14 mm. longo paulo longius, lobo mediano late obreniforme 12 mm. lato, sinu 5 mm. lato, lobis lateralibus triangularibus apice attenuatis. *Nux* 4–5 mm. longa, 1·5–2 mm. lata, fusca, apice haud pilosa.

Prov. Muğla, distr. Fethiye (Lycia) : Baba Dağ (ancient Anticragus) above Fethiye, 1700 m., Jul. 30, 1947, Davis 13672 (Typus in Herb. Kew.).

Subsp. *anticragi* grows outside the area of *P. linearis* (*typica*) and its var. *plumosa* Boiss. (Diagn. Pl. Or. Ser. II, 4, 46 : 1859), both of which belong to the Irano-Turanian element and are more easterly in their distribution than subsp. *anticragi* which grows in the Mediterranean territory of Lycia. I consider that its different phytogeography, together with the morphological differences cited in the diagnosis—most notably the leaf-shape—entitles the Lycian plant to subspecific rank.

The following gathering of *P. linearis* var. *plumosa* was made in Isauria (Prov. Antalya–Konya) : Kara Dağ (N. of Geyik Dağ), 2100 m., steppe-like hillside, local, Sept. 1, 1947, No. 14669—det. Rech. fil.

Phlomis monocephala P. H. Davis, sp. nov. (Sect. *Euphlomis* Benth. Subsect. *Dendrophlomis* Benth.) inter Ser. *angustebracteatas* Vierh. et Ser. *latebracteatas* Vierh.

Affinis *P. lyciae* D. Don sed caulibus gracilioribus, foliis ad basin haud cordatis, verticillastris singulis, bracteis obovato-ellipticis brevioribus, dentibus calycis fere obsolete spinulosis differt. A *P. chrysophylla* Boiss.

habitu gracili, floribus sessilibus, forma foliorum et bractearum facile distinguenda.

Frutex erectus, 1–1.5 m. altus, ramis gracilibus, cortice in senectute longitudinaliter fisso. *Folia* ramulorum sterilium petiolata; lamina oblonga, obtusa, basi cuneata, 2.5–3.5 cm. longa, 7–10 mm. lata, petiolo aliquantum longior, pilis stellatis adpressis dense tomentosa, canescens vel aureocanescens. *Caules* floriferi erecti, gracillimi, 30–40 cm. alti, 2 cm. lati, remotissime paucifoliati (foliis deciduis eis ramulorum sterilium ut videtur similibus) stellato tomentosi. *Bractee* obovato-ellipticae, acutae, adpressae incurvae dimidium calycis paulo superantes 1–2 mm. latae dorso stellatim tomentosae, margine longe albo-villosae. *Calyx* 1 cm. longus vel paulo ultro, tubulosus, pilis stellatis (praesertim in parte inferiore pilis simplicibus admixtis) villosus-tomentosus, ore subconstrictus atque barbatus, dentibus parte basali depresso-obcordatis, parte apicali fere obsolete spinulosis, spinulis vix 0.5 mm. longis. *Corolla* ignota. *Nuculae* oblongae, glabrae, 4.5 mm. longae, 1.5 mm. latae.

Prov. Antalya, distr. Alanya (Pamphylia–Isauria): between Kozlu Dere and Kargı Çay (N.E. of Alanya), in rocky calc. woods, 1000 m. Aug. 26, 1947, Davis 14250 (Typus in Herb. Kew.).

Although known only from fruiting material, there can be no doubt of this shrub's specific distinctness. *P. monocephala* differs from *P. lycia* D. Don in its slender habit, leaves cuneate at the base, single whorls, shorter ovate-elliptical bracts, and nearly obsolete calyx teeth. The calyx is like that of *P. chrysophylla*, but the new species differs markedly from the latter in its habit, sessile flowers, and the form of its leaves and bracts. In its facies and leaf-shape the new shrub recalls the Cyprian *P. brevis-bracteata* Turill, but the form of the bracts and calyces suggests no close affinity. *P. monocephala* is morphologically intermediate between Ser. *Angustebracteatae* Vierh. and Ser. *Latebracteatae* Vierh. (Vierh. in Oest. Bot. Zeitschr. **65**, 213–115: 1915), though its closest relationship is certainly with species in the former group.

***P. nissolii* L.**, Sp. Pl. 585 (1753).

Prov. Denizli, distr. Acipayam (Caria): Acipayam, in fallow chalky field, Jul. 18, 1947, No. 13464—det. Rech. fil.

***P. rigida* Lab.**, Ic. Pl. Syr. Rar. **3**, 15 (1809).

Prov. Antalya, distr. Alanya (Isauria): between Gönük Dere and Ak Dağ (S. of Geyik Dağ), Aug. 27, 1947, No. 14302. Prov. Konya, distr. Bozkır (Isauria): S. Karance Dere, between Geyik Dağ and Bozkır, Sept. 1, 1947, No. 14612. A very handsome plant.

***P. samia* L.**, Sp. Pl. 585 (1753).

Prov. Antalya (Pisidia): Termessus, 700–1000 m., herbaceous, 0.3–1 m. tall, fl. greenish with purple spots on lower lip, Aug. 11, 1947, No. 13950; distr. Alanya (Pamphylia–Isauria), between Kargı Çay bridge and Beydam, in *Pinus brutia* woodland, 1100 m., Aug. 26, 1947, No. 14253.

P. viscosa* Poiret** subsp. ***bourgaei (Boiss.) *P. H. Davis*, comb. et stat. nov.—*P. bourgaei* Boiss., Fl. Or. **4**, 787 (1879).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ near Kuzdere, 1000 m., Aug. 15, 1947, No. 14205 ; distr. Alanya (Pamphylia), at Alanya, Aug. 23, 1947, No. 14482.

A specimen in the Kew Herbarium, collected by Forbes at Arsa in Lycia, is intermediate between *P. bourgaei* (originally described from Antalya) and *P. viscosa*. On the strength of this, and because of the variability in length of calyx teeth and width of bracts found in the more Oriental *P. viscosa*, I have reduced *P. bourgaei* to a subspecies of the latter.

Phlomis sp. nov. ? (Sect. *Euphlomis* Benth. Subsect. *Dendrophlomis* Benth. Ser. *Angustebracteatae* Vierh.).

Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, near Ağla, 600 m., in *Pinus brutia* woods on serpentine, Jul. 25, 1947, No. 13586 (*fruct.*).

Though evidently closely related to *P. viscosa* Poiret, this shrub may well prove specifically distinct, but as no flowering material is available a description is not given here. The leaves are remarkably long and narrow.

Prunella vulgaris L., Sp. Pl. 600 (1753).

Prov. Denizli (Caria) : Taş Ocağı near Denizli, 600 m., by water, fl. mauve, Jul. 13, 1947, No. 13262.

Salvia bourgaeana Barbey in Bull. Soc. Vaud. Sc. Nat. **21**, 96 (1885).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, near Geyran Yaylâ, 1370 m., herb 0.6 m. tall, fl. lilac, Jul. 16, 1947, No. 13341 ; *ibid.*, 2130 m., No. 13377. Prov. Muğla, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, S. side, 2200 m., fl. lilac, Aug. 5, 1947, No. 13847—det. e descript.

Barbey describes his plant as “ minute tomentoso-pubescent cinereo-virens ”. My specimens all have glandular-pubescent stems. Some of the leaves are cordate at the base, as in the N.W. Persian *S. sahendica* Boiss. et Buhse (which shows a wide range in shape and size of leaf) and to which *S. bourgaeana* is certainly very closely related.

S. caespitosa Mont. et Aucher in Ann. Sc. Nat. Bot. Ser. II, **6**, 39 (1836).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, 2200 m., on rock outcrops, Aug. 16, 1947, No. 14173 ; *ibid.*, No. 14132.

S. candidissima Vahl, Enum. Pl. **1**, 278 (1804).

Prov. Ankara (Galatia) : between Kayaş and Kibris, fl. white, Jul. 6, 1947.

S. grandiflora Etlinger, Salv. 17, (1777).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, near Kuzdere, Aug. 15, 1947, No. 14207.

S. nemorosa L., Sp. Pl. ed. 2, 35 (1762).

Prov. Antalya, Girdev Göl, edge of field, fl. violet, Aug. 4, 1947, No. 13756.

S. potentillifolia Boiss. et Heldr. ex Benth. in DC., Prodr. **12**, 270 (1848).

Prov. Antalya, distr. Elmali (Lycia) : between Bel Yaylâ (on Girdev Dağ) and Yuva Yaylâ, 1700 m., fl. always pale yellow, Aug. 8, 1947, No. 13882.

The species was originally described from Ermenek in Isauria, and was stated to have violet flowers. But from Elmali in Lycia Bourgeau collected sulphur, blue and bicoloured forms under different numbers (Bourgeau 232, 233, 234' : the population I found, however, was entirely yellow-flowered.

S. recognita Fischer et Meyer in Ann. Sc. Nat. Bot. Ser. IV, **1**, 33 (1854).

Prov. Ankara (Galatia) : Kibris gorge near Kayaş, herbaceous, fl. pink, Jul. 6, 1947, No. 13148.

S. sclarea L., Sp. Pl. 27 (1753).

Prov. Ankara (Galatia) : between Kayaş and Kibris, bracts pink, fl. lavender, Jul. 6, 1947, No. 13126.

S. verticillata L., Sp. Pl. 26 (1753).

Prov. Ankara (Galatia) : hills between Kayaş and Kibris, fl. violet, Jul. 6 1947, No. 13120.

S. virgata Jacq., Hort. Bot. Vindob, **1**, 14 (1770).

Prov. Ankara (Galatia) : Beynam, 1200 m., steppe, fl. violet-blue, Jul. 5, 1947, No. 13020—forma haec indumento caulium et verticillas-trorum albo-tomentosulo a typo differt ; between Kayaş and Kibris, at edge of cultivation, Jul. 6, 1947, No. 13128—forma typica. Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, at Kuzdere, 1000 m., edge of field, fl. violet, Aug. 15, 1947, No. 14082—forma haec foliis minus rugulosis et minus crenatis a typo recedit. Prov. Konya (Lycaonia) : between Konya and Kaşanan, railway embankment, fl. violet, Sept. 7, 1947, No. 14771—folia vix rugulosa, subcrenata.

No. 13020 (a plant of steppe communities) is very distinctive on account of its woolly indumentum, that of the stems being almost without glands. It may require at least varietal rank, but more material is needed. A classification which widely separates, on the different curvature of the corolla hood, *S. virgata* Jacq. from *S. verticillata* L., is most unnatural. The curvature varies with the development of the flower, and in the Orient the two species are often very hard to distinguish. Krause (Ankaranin Floru, 1937) records *S. verticillata* (but not *S. virgata*) from the environs of Ankara, but I have seen no material from there that could definitely be referred to the former. The group certainly requires critical revision in the Orient.

Satureia cuneifolia Ten., Prodr. Fl. Nap. 33 (1811).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ near Geyran Yaylâ, fl. white, Jul. 16, 1947, No. 13333. Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ near Çukur Yaylâ, 1520 m., stony hillside with *Ballota cristata* and *Origanum minutiflorum*, fl. white, rarely very pale mauve, Aug. 15, 1947, No. 14190 ; distr. Alanya (Isauria), Gönük Dere on E. side of

Ak Dağ (S. of Geyik Dağ) 1000 m., rocks, fl. white, Aug. 27, 1947, No. 14293, and Han Boğaz forest near Geyik Dağ, 1520 m., in open *Cedretum*, fl. white, Aug. 30, 1947, No. 14722.

S. spinosa L., Sp. Pl. ed. 2, 795 (1763).

Prov. Muğla, distr. Fethiye (Lycia) : Baba Dağ above Fethiye, 1520–1670 m., in shaly calcareous rocks, fl. white, Jul. 30, 1947, No. 13670.

This interesting species has previously only been recorded from Crete and Samos. The Lycian material matches Cretan gatherings very well.

Scutellaria brevibracteata Stapf in Denkschr. Akad. Wiss. Wien. **50**, 99 (1885).

Prov. Muğla, distr. Fethiye (Lycia) : Baba Dağ (above Fethiye, 1370 m., in screes in *Cedrus* forest, fl. dusky violet, Jul. 30, 1947, No. 13682 ; *ibid.*, 1300 m., No. 13686 ; on the same mountain, between Ovacik and Akbel Yaylâ, fl. purple, Jul. 29, 1947, No. 13716. Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, near Çukur Yaylâ, 1520 m., rocky slopes, fl. violet, Aug. 15, No. 14189—det. Rech. fil.

S. orientalis L. subsp. **alpina** (Boiss.) O. Schwarz in Fedde, Repert. **36**, 134 (1934).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ above Geyran Yaylâ, 2130 m., Jul. 16, 1947, No. 13368—det. Rech. fil.

S. subvelutina Rech. fil. in Bot. Archiv, **43**, 31 (1941).

Prov. Ankara (Galatia) : Kibris gorge near Kayaş, Jul. 6, 1947, No. 13143. Prov. Antalya, distr. Alanya (Pamphylia–Isauria) : Kargı Çay (N.E. of Alanya, 1000 m., on scree slope, Aug. 25, 1947, No. 14241 (*forma*) ; *ibid.*, at the place called Taşatan, 900 m., scree, No. 14421 (*forma*) ; Han Boğaz forest (*Abietum*) near Geyik Dağ, 1600 m., Aug. 30, 1947, No. 14702 (f. ad *S. megalaspidem* Rech. fil. *accedens*)—det. Rech. fil.

Sideritis arguta Boiss. et Heldr. in Boiss., Diagn. Pl. Or. Ser. II, **4**, 32 (1859).

Prov. Antalya, distr. Alanya (Pamphylia–Isauria) : between Kargı Çay and Belister (N.E. of Alanya), 1100 m., fl. pale yellow, Aug. 26, 1947, No. 14234. The determination was very kindly checked for me by Dr. R. Weibel ; he compared this gathering with the type of *S. arguta* collected by Heldreich in the same district.

Boissier (Fl. Or. **4**, 712) made *S. arguta* synonymous with *S. libanotica* Lab., but I agree with Bornmüller (in Magyar Bot. Lap. **31**, 130) in considering it specifically distinct.

Sideritis argyrea P. H. Davis, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

Species pulchre sericea, facie affinis *S. cypriae* Post sed habitu haud saxatili, foliis caulinis oblongo-ovatis basi truncatis distincte petiolatis, verticillastris remotissimis, bracteis manifeste cuspidatis, dentibus calycis lanceolatis acuminato-spinulosis, corolla vix brunneo-notata removitur.

Planta basi suffrutescens, pluricaulis. *Caules* erecti, simplices, haud manifeste quadranguli, 40–100 cm. alti, 1.5 mm. lati, recti, inferne pilis

longis patentibus et pilis breviter glandulosis hirti, superne glanduloso-pubescentes, flavido-virides (vel nunc purpurascentes), internodiis 2-6 cm. longis. *Folia* caulina (inferiora evanescentia) petiolata, manifeste gemmifera, dense adpresso-sericea; lamina oblongo-ovata, basi \pm truncata (vel subcordata), 3-4 cm. longa, 1-1.7 (2) cm. lata, minutissime serrato-crenata; petiolus 2-5 mm. longus. *Verticillastrae* 3-10, in spicam valde interruptam internodiis infernis 4-7 cm. longis disposita. *Bracteae* flavido-virescentes, membranaceae, late orbiculares, cuspidae 2-5 mm. longae, munitae, imbricatae, glanduloso-hirsutae, \pm ciliatae, calycibus sublongiores, nervis haud valde prominentibus. *Calyx* 8-11 mm. longus, ad dimidium vel duas partes in dentes lanceolatos spinulosos glanduloso-hirsutos haud aequales fissus. *Corolla* citrina, pubescens, 1.5 cm. longa, tubo paulo exserto; labium inferius superiore sub-brevius, lobo mediano brevi late orbiculari. *Nuculae* ovatae, 2.5 mm. longae, 1.5 mm. latae, brunneae, nitidae. Floret Jul.-Aug.

Prov. Antalya, distr. Alanya (Pamphylia-Isauria): Kargi Çay (N. of Alanya between Durbanas and Derince Dere, flowers lemon yellow, Aug. 24, 1948, Davis 14402 Typus in Herb. Kew.); between Kizil Alan and Durbanas N. of Alanya, in the zones of *Pinus brutia* and *P. nigra* subsp. *pallasiana*, rocky slopes, Aug. 24, 1948, No. 14438.

This very distinct and attractive new species is apparently most closely related to *S. cypria* Post from the northern range of Cyprus. The latter plant was reduced by Lindberg (Iter Cyprum, 30, in Acta Soc. Sci. Fenn. (Nov. Ser. B) 2 (7): 1946) to a variety of *S. cilicica* Boiss. et Bal. Though certainly closely allied to that species, the reduction is to my mind unjustified, *S. cypria* being exceptionally well distinguished in a genus where lines are often hard to draw. Although approaching *S. cypria* in its habit more closely than *S. cilicica*, *S. argyrea* differs from both in its distinctly stalked, oblong-ovate stem-leaves, and slender acuminate calyx-teeth. From *S. cypria* the new species is further distinguished by the shape of its leaves and bracts, by its very remote whorls, and by its flower colour, the corolla of *S. cypria* being heavily marked with brown. Whereas the Cyprus species is confined to crevices of calcareous cliffs with a southern exposure, *S. argyrea* grows on rocky slopes in Pine woods.

Sideritis brevibracteata P. H. Davis, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

A *S. leptoclada* O. Schwarz et Davis caulibus lanatis paniculatis crassioribus, bractearum breviorum forma, dentibus calycis espinulosis divergit. A *S. lycia* Boiss. et Heldr. caulibus elatioribus ramosis, foliis caulinis \pm auriculatis, verticillastris minoribus, bracteis subreniformibus abrupte et breviter cuspidatis valde imbricatis quam calyces brevioribus, dentibus calycis minoris brevioribus discrepat.

Caules e base suffrutescente erecti, ad 80 cm. alti, araneoso-lanati, paniculati, in parte inferiore 2-2.5 mm. lati. *Folia* turionum steriliū minuta, late obovata, dense albo-pannosa; folia caulium floriferorum lineari-oblonga, \pm auriculata, araneosa, margine sinuato-crenata, deinde evanescentia, gemmis albis persistentibus. *Verticillastrae* 6-15, parva, 1 cm. diametro, in spicas interruptas (internodiis infernis 1.5-3 cm. longis) disposita. *Bracteae* late orbiculares vel subreniformes,

abrupte et breviter cuspidatae, calycibus aliquantum breviores, membranaceae, valde imbricatae conspicue reticulato-nervosae, glanduloso-puberulentae (pilis lanosis \pm deciduis), in senectute flavescentes. *Calyx* 7-8 mm. longus, glanduloso-puberulus, ad quartam vel tertiam partem in dentes lanceolatos subacuminatos fissus. *Corolla* vix 1 cm. longa, flava, pubescens, labio inferiore quam superius sub-breviore. *Nuces* vix 2 mm. longae, brunneae, papillosae.

Prov. Antalya, distr. Alanya (Pamphylia) : Alanya, 30 m., rocky limestone slopes above the harbour, with *Phlomis fruticosa* and *P. viscosa* subsp. *bourgaei*, flowers yellow, Aug. 23, 1947, Davis 14493 (Typus in Herb. Kew.).

The gathering on which the description is based was collected late in the season and is therefore not in ideal condition, but I consider that the plant's very distinctive appearance merits its publication as a new species. *S. brevibracteata* is a limestone plant, and is probably most closely related to *S. leptoclada* O. Schwarz et P. H. Davis from serpentine formations ; it can be easily distinguished from that species by its lanate indumentum, talled paniced stems, bracts (unusually small for the section) shorter than the calyces; and non-spiny calyx-teeth.

S. erythrantha Boiss. et Heldr. *apud Benth.* in DC., Prodr. **12**, 438 (1848) var. ***cedretorum*** P. H. Davis, var. nov.

A typo indumento sparsiore, foliis caulinis manifestius nervosis, plerumque angustioribus, dentibus calycis brevioribus, corolla citrina (haud purpurea) lineis tenuibus purpureo-brunneis graciliter notata divergit. Floret Aug.

Prov. Antalya, distr. Alanya (Isauria) : Han Boğaz forest near Geyik Dağ, 1520 m., in *Cedretum*, fl. lemon yellow with purplish-brown veining, Aug. 30, 1947, Davis, No. 14723 (Typus in Herb. Kew.).

I have not seen the typical form of this rare species in the field.

S. galatica Bornm. in Magyar Bot. Lap. **31**, 135 (1932).

Prov. Ankara (Galatia) : Kibris gorge near Kayaş, fl. pale yellow, Jul. 6, 1947, No. 13143.

Sideritis leptoclada O. Schwarz et P. H. Davis, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

A *S. gracili* Barbey caulibus pubescentibus, foliis turionum sterilium bombycinis, caulinis breviter auriculatis, dentibus calycis sub-brevioribus manifeste spinulosis abhorret. A *S. brevibracteata* P. H. Davis caulibus simplicibus gracillimis pubescentibus, bracteis longioribus, forma calycis inter alia facile separanda. Species regionis inferioris serpentine.

Planta basi suffrutescens. *Caules* erecti, gracillimi, rigidi, quadranguli, simplices (si ab animalibus adesi saepe ramosi) 20-60 cm. alti, 1 mm. lati, pilis brevibus glandulosis et longis patentibus pubescentes. *Folia* turionum sterilium parva, obovata, densissime niveo-pannosa ; folia caulium floriferorum oblongo-linearum, sessilia, basi breviter auriculata, 1.5-3 cm. longa, 2.5-4 mm. lata, minute serrato-crenata, araneosa. *Verticillastra* 2-5, remota, 1-1.5 cm. lata, spicam interruptam internodiis 2-5 cm. longis formantia. *Bractae* orbiculares, luteo-virides, imbricatae,

pungenti-cuspidatae, calyce paulo longiores, membranaceae, glanduloso-pubescentes, ciliatae. *Calyx* 7–8 mm. longus, glandulosus, ad quartam vel tertiam partem in dentes triangulari-lanceolatos villosos in spinulam brevem lutescentem exeuntes fissus. *Corolla* 9 mm. longa, hirsuta, citrina, tubo haud exserto, labiis aequilongis. *Nuculae* ignotae. Floret Jun.–Jul.

Prov. Muğla, distr. Köyceğiz (Caria) : between Dalaman and Göcek, below 300 m., in open *Pinetum brutiae*, Jul. 26, 1947, Davis, 13566 (Typus in Herb. Kew.) ; Sandras Dağ below Ağa, 300 m., on serpentine in *Pinetum brutiae*, Jul. 25, 1947, Davis 13583 ; near Aliköy, 800 m., Jul. 14, 1938, Schwarz 746.

S. leptoclada, as known at present, is confined to serpentine soils in the *Pinus brutia* forests of S. Caria. In the diagnosis the plant has for convenience been compared with *S. gracilis* Barbey (from higher altitudes on the limestones of Lycia), although it is doubtful whether the latter is specifically distinct from *S. libanotica* Lab. (*vide infra*).

S. libanotica Lab., Ic. Pl. Syr. **4**, 13 1812, *emend. Bornm. sensu lato, incl. S. gracili* Barbey.

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ above Geyran Yaylâ, 2130 m., Jul. 16, 1947, No. 13380. Prov. Muğla, distr. Fethiye Lycia : Baba Dağ, above Akbel Yaylâ, 1370 m., fl. lemon yellow, Jul. 30, 1947, No. 13681 ; *ibid.*, 1520–2130 m., No. 13673 ; *ibid.*, 1520 m., No. 14183. Prov. Antalya, distr. Elmalı (Lycia) : Yuva, 1100 m., fl. pale lemon yellow, Aug. 7, 1947, No. 13734 ; distr. Kemer (Lycia), Tahtalı Dağ, 2100 m., Aug. 16, 1947, No. 14200 (grazed), and on the same mountain between Çukur Yaylâ and Kuzdere, 1520 m., Aug. 15, 1947, No. 14183.

I have provisionally had to accept a rather wide concept of *S. libanotica* Lab., and prefer not to recognise precise sub-specific units until I have seen Labillardière's type and have studied the plants more thoroughly in the field. Unfortunately *S. libanotica* var. *genuina* Bornm. (in Magyar Bot. Lap. **31**, 139 : 1932, is not based on the type of the species but on Ehrenberg's specimens from Bscherre in Lebanon which differ slightly from Labillardière's original figure and description. From the Cilician Taurus Bornmüller (*l.c.*) recognises two subspecies of *S. libanotica*—subsp. *ambigua* Fenzl (*pro spec.*, ex Bornm. and subsp. *linearis* (Benth.) Bornm.—which seem to me doubtfully distinct from one another though certainly well distinguished from the Lebanese specimens I have seen. Furthermore if the plants from the Cilician Taurus are to be retained in *S. libanotica*, I do not see that the Lycian *S. gracilis* Barbey can be kept as a distinct species. Bornmüller, in fact, has pointed out that this plant (which he cites as a species) may be considered a glabrous form of *S. libanotica* subsp. *ambigua* ; the co-type of *S. gracilis* in Herb. Kew., however, is definitely hairy !

In the Lycian Taurus I made several gatherings belonging to this complex (cited above), none of which can be said to match exactly the co-type of *S. gracilis* ; they show a very considerable range of variation, but the majority resemble *S. libanotica* subsp. *ambigua*. I have therefore tentatively referred all these to *S. libanotica sensu lato*. It is possible, however, that further study may show that the Taurus forms of *S.*

libanotica are specifically distinct from the Lebanon plants ; in that case, if one specific name is required to cover the Anatolian material, *S. gracilis* Barbey has priority. I agree with Bornmüller (*l.c.*) in assigning specific rank to *S. arguta* Boiss. et Heldr.

It should be mentioned that a plant was collected in the Antilebanon (Davis 1972) which differs somewhat from Lebanon material of *S. libanotica* ; in its small bracts it recalls the Irano-Turanian *S. microchlamys* (Handel-Mazzetti) Bornm., a plant originally described as a variety of *S. libanotica*. In the N.E. of Mt. Lebanon (between Hermel and Merj Sh'in) another *Sideritis* was collected (Davis 19870) that may prove specifically distinct ; it has very tall stems, obovate leaves, and relatively close spikes which give it a resemblance to *S. pisidica* Boiss. et Heldr.

S. montana *L.* var. **comosa** Boiss. f. **xanthocoma** Azn. in Bull. Soc. Bot. France, **44**, 174 (1897).

Prov. Ankara (Galatia) : Hacikadun valley near Ankara, Jul. 9, 1947, No. 13179.

var. **cryptantha** Boiss., Fl. Or. **4**, 707 (1879).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, 2280 m., Jul. 16, 1947, No. 13417, fl. lilac *in sicc.*

Hayek (Prodr. Fl. Balc. **2**, 256) ignores var. *cryptantha* on the grounds that it is apparently a cleistogamous form. My specimens, however, match closely a gathering in the Kew Herbarium collected by Heldreich at Bouldour (Burdur) in Pisidia and determined as this variety by Boissier. As No. 13417, whether it is cleistogamous or not, certainly represents a population, I have retained the varietal name.

S. perfoliata *L.*, Sp. Pl. 575 (1753).

Prov. Antalya, distr. Alanya (Pamphylia) : between Kizil Kaya Dibi and Kizil Alan (N. of Alanya), root smelling of poppies, Aug. 24, 1947, No. 14458.

S. pisidica Boiss. et Heldr. *apud* Benth. in DC., Prodr. **12**, 440 (1848).

Prov. Muğla, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, S. side, 2000 m., Aug. 5, 1947, No. 13830 ; *ibid.*, on rocks, very goat-eaten, Aug. 6, 1947 (no number). Prov. Antalya (Pisidia) : Termessus, above Yenice Khav, 600 m., in *Quercetum*, Aug. 11, 1947, No. 13947.

No. 13830 differs from the co-type in that the lower lip of the corolla is not shorter than the upper one.

S. remota *Urv.* in Mem. Soc. Linn. Paris, **1**, 322 (1822).

Prov. Denizli, distr. Acipayam (Caria) : Monastir Ormani, between Acipayam and Abbas, open places near dry river bed in *Pinetum brutiae*, Jul. 18, 1947, No. 13469.

S. stricta Boiss. et Heldr. *apud* Benth. in DC., Prodr. **12**, 441 (1848).

Prov. Antalya (Pisidia) : between Termessus and Yenice Khav, in *Quercus* maquis, 460 m., stem simple or 3-branched, Aug. 11, 1947, No. 13940. The species is certainly closely related to *S. perfoliata* *L.*

Sideritis violascens *P. H. Davis*, sp. nov. (Sect. *Empedoclea* (Rafin.) Benth.).

Affinis *S. libanoticae* Lab. praesertim subsp. *ambiguae* Fenzl (*pro spec.*) ex Bornm., sed rhizomate lignoso manifeste procumbente, caulibus minus rigidis, foliis turionum sterilium semper obovatis, floribus violascentibus divergit.

Planta gemmis lanatis minutis basi praedita. *Caules* ascendentes, 20–30 cm. alti, subsimplices, tenues, lanati. *Folia* serrulata crenis mucronulatis ea turionum sterilium obovata in petiolum sensim attenuata, ad 6 cm. longa et 1.2 cm. lata, subflaccida, lanata, juventute grisea, ea caulina pauca, valde remota, obovata, oblonga, superiora subsessilia. *Verticillastra* parva, 2–6, remotissima, 1–1.5 cm. lata, in spicam internodiis 3–6 cm. longis disposita. *Bractae* late orbiculares, breviter cuspidatae, calyce paulo breviores, vix imbricatae, purpurascentes, membranaceae, glandulosae, sublanatae, inconspicue nervosae. *Calyx* 7–9 mm. longus, purpurascens, in toto glanduloso-villosus, ad tertiam partem in dentes triangulari-lanceolatos acutos divisus. *Corolla* 8–10 mm. longa, violascens, hirtula, tubo haud exserto. *Nuculae* ignotae. Floret Aug.

Prov. Konya, distr. Bozkir (Isauria) : S. Karance Dere between Geyik Dağ and Bozkir, 1800 m., flowers violet, Sept. 1, 1947, Davis, 14611 (Typus in Herb. Kew.) ; *ibid.*, No. 14611. Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2280–2440 m., flowers dusky violet, Aug. 31, 1947, No. 14546.

No. 14646, from Han Boğaz forest near Geyik Dağ, has a more sturdy inflorescence than the numbers quoted above, but probably belongs to the same species ; it has not been included in the description.

I have referred, under *S. libanotica*, to some of the problems in the classification of that polymorphic supraspecies. A tendency to use *S. libanotica* as a dumping ground, however, is to be discouraged, and, though I am still undecided as to the specific limits of *S. libanotica*, I do not believe that *S. violascens* could be included in it. From *S. libanotica* Lab. (*emend.* Bornm. *sensu lato*, incl. *S. gracili* Barbey) it is easy to distinguish *S. violascens* by its habit, the woody base being somewhat repent ; the stems are less rigid, the leaves of the sterile shoots always manifestly obovate, and the colour of the flowers is violet—a colour, so far as is known, occurring elsewhere in Sect. *Empedoclea* only in *S. erythrantha* Boiss. et Heldr. (*typica*). *S. libanotica* appears to be absent from the part of the Taurus where *S. violascens* was found, Heldreich's specimen quoted in Boiss., Fl. Or. 4, 112, being *S. arguta* Boiss. et Heldr. The section is extremely well represented in the district.

Sideritis aff. **condensatae** Boiss. et Heldr. *apud Benth.* in DC., Prodr. 12, 439 (1848).

Prov. Antalya, distr. Alanya (Isauria) : Beydam (near Geyik Dağ), 1000 m., cultivated, Aug. 26, 1947, No. 14249. Fragmentary specimens were brought to me by the villagers of Beydam who cultivate the plant ; they assured me that it had been collected in the mountains nearby. The indumentum is like that of *S. condensata* var. *procumbens* Boiss. et Heldr., but the bracts are larger and prominently veined.

Sideritis aff. **perfoliatae** L., Sp. Pl. 575 (1753).

Prov. Konya, distr. Bozkir (Lycaonia Isauria) : Bozkir, 1100 m., on chalky steppe hills, Sept. 2, 1947, No. 14583 (*fruct.*). The whorls are all exceedingly distant from one another.

Stachys citrina Boiss. et Heldr. *apud Benth.* in DC., Prodr. **12**, 490 (1848).

Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2430 m., generally in calc. rocks, perennial, fl. bright lemon yellow with two purple lines on upper lip, Aug. 31, 1947, No. 14510 ; *ibid.*, No. 14574 ; Ak Dağ (S. of Geyik Dağ), 2300 m., in rocks near little lake, Aug. 28, 1947, No. 14346 ; *ibid.*, above Siricek Yaylâ, generally grazed, No. 14330. A beautiful species.

S. cretica L. subsp. **anatolica** Rech. fil. in Ann. Nat. Hofmus. Wien, **48**, 175 (1937).

Prov. Ankara (Galatia) : Beynam, 1200 m., in fallow field, Jul. 5, 1947, No. 13001.

S. cretica L. aff. subsp. **mersinaeae** Rech. fil. in Ann. Nat. Hofmus. Wien, **48**, 176 (1937).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, near Çukur Yaylâ, 1500 m., Aug. 15, 1947, No. 14212 ; *ibid.*, 1460 m., Aug. 17, 1947, No. 14090.

The teeth are more broadly triangular than in typical Cilician material of this subspecies, and only very shortly mucronate.

S. germanica L. aff. subsp. **heldreichii** (Boiss.) Hayek, Prodr. Fl. Balc. **2**, 285 (1929).

Prov. Muğla, distr. Köyceğiz (Caria) : Köyceğiz, by the road, annual ? Jul. 25, 1947, No. 13564.

Teucrium chamaedrys L. subsp. **tauricolum** Rech. fil. in Bot. Archiv **42**, 376 (1941).

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, 2200 m., fl. purplish, Aug. 16, 1947, No. 14135—det. Rech. fil.

subsp. **sypsiense** (C. Koch) Rech. fil. var. **hirsutum** (Cels. in Bot. Centr. **14**, 220 : 1883) Rech. fil. in Ann. Nat. Hofmus. Wien **51**, 427 (1941).

Prov. Ankara (Galatia) : Beynam, 1200 m., steppe, fl. purplish-red, Jul. 5, 1947, No. 13013.

f. inter subsp. **tauricolum** Rech. fil. et subsp. **sypsiense** (C. Koch) Rech. fil.

Prov. Muğla, distr. Fethiye (Lycia) : Kara Tepe near Seki Yaylâ, 1640 m., fl. purple, Aug. 3, 1947, No. 13874 ; Girdev (Eren) Dağ, S. side, 2200 m., Aug. 5, 1947. Prov. Antalya, distr. Alanya (Pamphylia-Isauria) : Kargı Çay between Durbanas and Derince Dere (N.E. of Alanya), Aug. 24, 1947, No. 14408.—det. Rech. fil.

f. inter subsp. **tauricolum** Rech. fil. et subsp. **eu-chamaedrys** Rech. fil. in Bot. Archiv **42**, 344 (1941).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, between Abbas and Geyran Yaylâ, fl. reddish purple, Jul. 16, 1947, No. 13322 ; *ibid.*, near Geyran Yaylâ, 1370 m., in *Pinus nigra* subsp. *pallasiana* forest, fl. reddish-purple, Jul. 16, 1947, No. 13330.—det. Rech. fil.

T. lamiifolium *Urville* in Mem. Soc. Linn. Paris, **1**, 320 (1822).

Prov. Antalya, distr. Alanya (Isauria) : Han Boğaz forest, near Geyik Dağ, 1520 m., Aug. 30, 1947, No. 14719.

T. montanum *L.* var. **parnassicum** *Čel.* in Bot. Centr. **14**, 153 (1883).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, 1820–2130 m., fl. pale yellow, Jul. 16, 1947, No. 13399.

T. montbretii *Benth.* in Ann. Sci. Nat. Bot. Ser. II, **4**, 56 (1836).

Prov. Antalya (Pamphylia) : Antalya, in tufa rocks to the W. of the harbour, scarce, stems appressed to the rocks, very brittle, fl. lilac, Aug. 19, 1947, No. 14217. Boissier (Fl. Or. **4**, 815) cites sterile specimens collected in this locality by Bourgeau. The species has a disjunct distribution in the Levant, Antalya being apparently its most westerly station. Its most southern locality is in Judea, where it grows upside-down on the roofs of dry caverns.

T. orientale *L.*, Sp. Pl. 562 (1753).

Prov. Ankara (Galatia) : between Kayaş and Kibris, steppe hills, fl. lilac-blue, Jul. 6, 1947, No. 13125.

T. polium *L.*, Sp. Pl. 566 (1753) *sensu lato*.

Prov. Ankara (Galatia) : Beynam, 1200 m., steppe, fl. whitish, Jul. 5, 1947, No. 13016 ; *ibid.*, in *Quercus* zone, No. 13081. Prov. Denizli, distr. Fethiye (Caria) : Boz Dağ, near Geyran Yaylâ, 1370 m., fl. white, Jul. 16, 1947, No. 13332 ; *ibid.*, between Abbas and Geyran Yaylâ, procumbent, No. 13321. Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, 2000 m., near Gökce Ova, on serpentine, fl. white, Jul. 23, 1947, No. 13520 ; *ibid.*, 1520 m., near Köklüce, on serpentine, fl. white, Jul. 22, 1947, No. 13630 ; distr. Fethiye (Lycia), on Baba Dağ between Ovacık (above Fethiye) and Akbel Yaylâ, 600 m., Jul. 29, 1947, No. 13718, and on Kara Tepe near Seki Yaylâ, 1600 m., fl. white, Aug. 3, 1947, No. 13873.

T. sandrasicum *O. Schwarz* in J. R. Hort. Soc. **74** (3) 115 (1949).

Prov. Muğla, distr. Köyceğiz : Sandras Dağ, 1060–1520 m., on serpentine on open S. slopes in *Pinus nigra* subsp. *pallasiana* forest, fl. lavender-blue, Jul. 22, 1947, No. 13559. The species is related to *T. creticum* *L.* in Sect. *Teucriis* *Benth.* Ser. *Integrifoliae* *Briq.*

T. scordioides *Schreb.*, Pl. Vert. Unilab. 37, (1774).

Prov. Denizli (Caria) : Taş Ocağı near Denizli, 600 m., by stream, Jul. 13, 1947, No. 13271. Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ at Köklüce, by stream, Jul. 23, 1947, No. 13601. Prov. Antalya, distr. Elmalı (Lycia) : Kara Göl near Yuva, 1000 m., fallow fields, Aug. 7, 1947, No. 13921. Prov. Konya (Lycaonia) : between

Konya and Kayacik, in dryish saline marshes, fl. purplish-pink, Sept. 6, 1947, No. 14738.

Thymbra sintenisii Bornm. et Aznavour in Fedde, Repert. **10**, 471 (1912).

Prov. Antalya, distr. Alanya (Pamphylia-Isauria) : Kargi Çay, between Durbanas and Derince Dere, rocky slopes, fl. white, Aug. 25, 1947, No. 14464.

This gathering differs from the type in the longer ciliation both of the leaves and somewhat longer bracts, and in the more slender teeth of the upper calyx-lip. As in the type, the calyx is covered with very short crisp hairs.

T. spicata L., Sp. Pl. 569 (1753) (*typica*).

Prov. Antalya, distr. Alanya (Pamphylia) : Alanya, Aug. 23, 1947, No. 14486.

var. **intricata** P. H. Davis, var. nov.

A typo ramis floriferis abbreviatis valde divaricato-ramosis fruticem nanum intricatum rigidum formantibus, spicis brevibus, bracteis minoribus parce ciliatis calycibus aequilongis distinguitur.

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, near Geyran Yayla, 1220-1520 m., dominant on dry gravelly slope facing S., fl. purple, Jul. 16, 1947, No. 13328.

Examination of plentiful material of *T. spicata* L., and acquaintance with this species in the field, indicate that the new variety can scarcely be considered a modification of the typical form due to dry conditions or to grazing. *T. spicata* L. frequently grows in drier habitats. In the variety described above, the branches do not appear to ramify in this characteristic manner (the angle of branching being about 80°) after having been nibbled off; nor is the plant flowering out of season. *T. spicata* was not found elsewhere in the Boz Dağ region, but in the locality where var. *intricata* was collected. The latter was the only form seen, being dominant over the hillside; I therefore assume that it has a genetic basis. Nevertheless, specimens intermediate between this variety and the type were collected in W. Lycia (slopes of Baba Dağ, between Fethiye and Ovacik, Jul. 29, 1947, No. 13713); as the plants were growing on a steep shady bank under pines they were probably out of character.

Thymus chaubardii (Boiss. et Heldr.) Čel. var. **boeticus** (H. Braun) Ronn. in Hayek, Prodr. Fl. Balc. **2**, 347 (1929).

Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, at Gökce Ova, on serpentine, Jul. 23, 1947 (no number)—det. Ronn.

T. cilicicus Boiss. et Bal. in Boiss., Diagn. Pl. Or. Ser. II, **4**, 8 (1859).

Prov. Antalya, distr. Alanya (Isauria) : Han Boğaz forest (S. of Geyik Dağ) 1820 m., in gravel of dry stream bed and along its sides, fl. violet-purple, Aug. 30, 1947, No. 14647; *ibid.*, 1600 m., in dry river bed, No. 14721.—det. Ronn.

T. hirsutus M.B. var. **cherlerioides** (Vis.) Ronn. in Rech. fil., Fl. Aegaea, 541 (1943).

Prov. Antalya, distr. Alanya (Isauria) : Geyik Dağ, 2130 m., Aug. 31, 1947, No. 14530 (with old leaves glabrescent) ; *ibid.*, 2590 m., No. 14569.—det. Ronn.

T. longicaulis Presl f. **albiflorus** Berger in Allg. Bot. Zeitschr. **20**, 15 (1914).

Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, near Gökce Ova, 1700 m., fl. white, Jul. 23, 1947, No. 13497.—det. Ronn.

T. sipyleus Boiss., Diagn. Pl. Or. Ser. I. **5**, 16 (1844) (*typica* : dentes calycis superiores ciliati).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, above Geyran Yaylâ, 1820–2130 m., Jul. 16, 1947, No. 13362a.—det. Ronn.

var. **davisianus** Ronn., var. nov.

Folia utrinque breviter pilosa ; calycis tubus pilis brevibus obtectus, ventraliter ciliatus ; dentes calycis superiores pilis unicellularibus ciliati, sub lente glabrescentes.

Prov. Muğla, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, S. side of mountain, 2000 m., Aug. 5, 1947, No. 13833.—det. Ronn.

var. **imbricatus** Çel. Ronn. in Rech. fil., Fl. Aegaea, 540 (1943).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, above Geyran Yaylâ, 1820–2130 m., Jul. 16, 1947, No. 13362 b (with the typical form).
Prov. Muğla, distr. Köyceğiz (Caria) : Sandras Dağ, 2200 m., Jul. 23, 1947, No. 13543.—det. Ronn.

var. **imbricatus** Çel. Ronn. f. **rhodochrous** Ronn., forma nov.

Calyces rubescentes, corollae roseolo-lilacinae.

Prov. Antalya, distr. Kemer (Lycia) : Tahtali Dağ, 2100–2300 m., fl. rosy lilac, Aug. 16, 1947, No. 14120.—det. Ronn.

var. **punctatus** Ronn., var. nov.—*T. punctatus* Visiani in Mem. Ist. Venet. **1**, 1842, 43 (1843), non Willd. (1794)=*Ziziphora clinopodioides* M.B.

Prov. Ankara (Galatia) : Beynam, 1200 m., shaly S. slope, erect, lemon-scented, white-flowered, Jul. 5, 1947, No. 13104.—det. Ronn.

T. toseovii Vel. f. **leucanthus** Deg. et Urum. in Stoj. et Stef., Fl. Bulg. 970 (1924).

Prov. Denizli, distr. Acipayam (Caria) : Boz Dağ, between Abbas and Geyran Yaylâ, 1370 m., flowering stems erect, fl. white, Jul. 16, 1947, No. 13349.—det. Ronn.

Ziziphora capitata L., Sp. Pl. 21 (1753).

Prov. Ankara (Galatia) : Hacikadun valley near Kecioren, by stream, Jul. 9, 1947, No. 13175.

Z. clinopodioides M.B. var. **canescens** Benth., Lab. Gen. et Sp. 321 (1833).

Prov. Muğla, distr. Fethiye (Lycia) : Girdev (Eren) Dağ, 2200 m., fl. pale mauve, Aug. 3, 1947, No. 13779. Prov. Antalya, distr. Alanya

(Isauria) : Geyik Dağ, 2130 m., in gravel of dry stream bed, Aug. 31, 1947, No. 14526.

Addendum.

Attention is drawn to the correct dates of publication of volumes 4 and 5 of Boissier's *Flora Orientalis* which are found in libraries bearing the dates 1879 and 1884 respectively. Both these volumes were published in two separate fascicles as follows : Vol. 4 (1) 1-280 (1875) ; Vol. 4 (2) 281-1276 (1879) ; Vol. 5 (1) 1-428 (July 1882) ; Vol. 5 (2) 429-868 (April 1884).

There is no dated title page to the first fascicle of each volume ; only the cover bears the correct date of publication, but this has in most cases been removed in binding the two parts together. The dated title page of the second fascicle (which, unlike its cover, does not indicate to which fascicle it belongs) has therefore been used as the title page for the whole volume. (cf. Buhse, *Fl. Or. suppl.* p. xxvi : 1888).

Taenioma perpusillum (*J. Ag.*) *J. Ag.-Taenioma*, a genus of two species with a wide distribution, has been a subject of contention since its original publication. Agardh placed it amongst the *Rhodomelaceae*. It was soon removed to *Delesseriaceae*, where according to recent researches by Tseng and Papenfuss it seems firmly established in spite of attempts to restore it to the *Rhodomelaceae*. Their main argument is that the formation of the pericentral cells without exception so far, follows the same sequence within the family.

As there has also been a good deal of controversy about the validity of keeping apart the two species *T. perpusillum* and *T. macrourum* I would like to draw attention to some material I have received from the Gold Coast. It was collected at Sekondi (about 5° N. Lat.) by Miss V. J. Foote of Achimota. In a preliminary scrutiny of the collection I came across one small gathering of a plant which answers in detail to the descriptions of *T. perpusillum*. It confirms the observation of Papenfuss that the three monosiphonous terminal hairs are a constant feature. Papenfuss states that cystocarps have been observed with certainty only by Thompson (1910) and since I have myself not come across any later reference to the finding of cystocarps, and as fruiting habits of the Algae are often unpredictable, it is worth while recording that this Gold Coast material collected in April has abundant mature cystocarps.

C. I. DICKINSON.

AFRICAN ORCHIDS: XIX*

V. S. SUMMERHAYES

The most important part of the present contribution is a revision of the Angraecoid genus *Rangaeris* Summerh. There are also notes on other Angraecoid genera and the description of a new genus *Ypsilopus*. Apart from the monopodial orchids new species from the genera *Habenaria*, *Bonatea* and *Polystachya* are described, together with taxonomic and nomenclatural notes on these and other genera. The type specimens of all the new species are in the Kew Herbarium.

***Habenaria montolivaea* Kraenzl. ex Engl.** Hochgebirgsfl. Trop. Afr. 183 (1892).

Peristylus albidulus Chiov. in Ann. di Bot., Roma, **9**, 137 (1911).

Comparison of the two type gatherings shows that the above are identical. In spite of Kraenzlin's and Rolfe's remarks I think there is little doubt that the species is closely allied to *H. petitiana* (A. Rich.) Dur. & Schinz and similar species. It agrees with these species, placed erroneously in *Peristylus* by Rolfe, in habit and general floral structure, but differs in the larger rostellum and smaller stigmas.

***Habenaria jaegeri* Summerh.** in Kew Bull. **1947**, 124 (1948).

Recently I have seen further material of this species collected by Mr. R. Schnell on the Massif du Fon in French Guinea. This enables me to emend my original description and to fill some of the gaps.

In the first place it is clear that the spur is often much longer than in the Type Specimen. Three flowers from different plants which I have measured have spurs ranging from 5.7–7.5 cm. as compared with 3.75 cm. in the Type. In other respects the flowers agree excellently, especially as regards the general features of the column, the sessile stigmas, and the shape and pectination of the side-lobes of the lip. The anther-canals in this species are comparatively short, only about 2 mm. in length, and are turned inwards towards the mouth of the spur. The staminodes are very short and rounded, only projecting slightly above the anther canal at that point.

***Habenaria* (§ *Multipartitae*) *splendendor* Summerhayes**, sp. nov.; *H. splendens* Rendle sec. Summerh. in Curtis, Bot. Mag. **157**, t. 9350 (1934), tantum quoad tab., et descr. partim, ceteris exclusis; ab *H. splendens* Rendle floribus paucioribus majoribus, petalis angustioribus, calcaribus 6–7.5 cm. longo satis distincta.

Herba terrestris 30–70 cm. alta; tubera ovoidea vel ellipsoidea, ± tomentosa, 2–6 cm. longa, 1–2 cm. diametro; radices graciles, flexuosae, pubescentes. *Caulis* erectus, verosimiliter teres, 20–50 cm. altus, basi circiter 1 cm. diametro, per totam longitudinem foliatus, glaber, in inflorescentiam terminans. *Folia* 6–10, 2–3 infima vaginiformia vel apice tantum in laminam explanata, intermedia orbiculari-ovata, ovata vel lanceolato-ovata, vel in caulibus sterilibus oblongo-elliptica, apice apiculata vel breviter acuminata, lamina usque ad 15 cm. longa et 9 cm. lata, superiora lanceolata, acuta, in bracteis abeuntia. *Inflorescentia*

* Continued from K.B., 1948, 302.

3-12-flora, usque ad 25 cm. longa et 13 cm. diametro; bractae foliaceae, lanceolatae, acutae vel acuminatae, 4-10 cm. longae, 1-3 cm. latae, flores aequantes, tri- vel quinquenerviae. Flores magni, erecto-patentes, partim virides, partim albi; pedicellus cum ovario circiter 3-3.5 cm. longus. *Sepalum* intermedium erectum vel leviter recurvatum, lanceolato- vel ovato-ellipticum, apice acutum vel apiculatum, leviter cucullatum, 3-3.5 cm. longum, 1.5-1.9 cm. latum; sepala lateraliter patentia, ex ungue circiter 5 mm. longo cum antherae connectivo adnato oblique curvatum lanceolata vel ovato-lanceolata, acuminata, 3.2-4.2 cm. longa, 1.3-1.6 cm. lata; sepala omnia viridia, septem-nervia. *Petala* falcatis lanceolato-ligulata, apice obtusa, basi angustata per 5 mm. antherae connectivo adnata, 3.2-3.8 cm. longa, 6-9 mm. lata, 6-7-nervia, alba apice viridia, glabra, marginibus ciliolatis. *Labellum* ex ungue leviter canaliculato 12-15 mm. longo profunde tripartitum, in toto 4-5 cm. longum et latum; partitio intermedia recta vel leviter decurvata, ligulato-linearis, obtusa, 2.5-3.5 cm. longa, 1.5-2.5 mm. lata, marginibus recurvatis, puberula; partitiones laterales inferne divergentes superne arcuatim incurvatae, lineari-ligulatae, 2.5-3.5 cm. longae, 2-3 mm. latae, marginibus exterioribus basi excepta longe pectinatae, puberulae, laciniis 9-13 filiformi-linearibus \pm patentibus 5-14 mm. longis interdum ramosis glabris; calcar cylindricum, ex ore satis lato per duobus trientibus inferioribus sensim angustatum, dependens, deinde valde incurvatum et modice clavato-inflatum, apice obtusum, 6-7.5 cm. longum; labellum ungue et lobi basi album, ceterum viride. *Antherae* connectivum taeniale, \pm hippocrepidiforme, 14-18 mm. latum, dorso 5 mm. altum, cum rostello adnatum; loculi sub-erecti, circiter 6 mm. longi; canales porrecti vel levissime incurvati, graciles, 6-8 mm. longi; staminodia stipitata, clavato-capitata. *Brachia* stigmatifera dimidio inferiore rostello adnata, dimidio superiore libera porrecta vel curvatum descendens; pars libera 11-15 mm. longa, inferne teres, dimidio superiore clavato-inflata, receptiva; rostellum lobus intermedius nullus.

NORTHERN RHODESIA. Mwinilunga District, just north of Matonchi Farm, in *Brachystegia* woodland, colony of several plants, Dec. 1937, Milne-Redhead 3789 (type).

BELGIAN CONGO. Katanga Prov., Beau Sejour Valley, near Elisabethville, common, Jan. 1924, Von Hirschberg 183; Elisabethville, cult. Sanders, St. Albans, Jan. 1931.

This plant, when cultivated in England in 1931, was thought merely to be a large flowered individual of *H. splendens* Rendle, the extra size being due to cultivation. Further investigation has shown, however, that wild specimens show the same differences from typical *H. splendens*, which is a comparatively uniform species. The most obvious feature of the new species is the much longer and differently shaped spur, but the flowers are distinctly larger in almost all respects, a notable exception being the narrower petals. In general features of floral structure, however, the species agrees very well with *H. splendens* Rendle, *H. praestans* Rendle and *H. mannii* Hook. f., all three having a very broad ribbon-like horseshoe-shaped anther-connective.

Habenaria (§ **Multipartitae**) **egregia** Summerhayes, sp. nov.; affinis *H. splendenti* Rendle et *H. splendentiori* Summerh., a quibus floribus

majoribus, sepalis acutioribus, labelli calcari multo longiore, antherae-connectivo duplo altiore, loculis et canalibus \pm duplo longioribus facile distinguenda.

Herba terrestris, elata, circiter 1 m. alta, fere omnino glabra; tuber (unum solum visum), ellipsoideum, 12 mm. longum, 5 mm. diametro; radices flexuosae, graciles, pubescentes. *Caulis* \pm teres, basi fere 1 cm. diametro, usque ad inflorescentiam sublaxe circiter 8-foliatus. *Folia* adscendentia, lanceolata vel ovato-lanceolata, acuminata, basi vaginantia, 9–15 cm. longa, 3.5–5 cm. lata, sursum sensim decrescentia, plurinervia, in bracteas abeuntia. *Inflorescentia* circiter 4-flora, circiter 12 cm. longa et 7 cm. diametro; bracteae foliaceae, lanceolatae, acutae vel acuminatae, flores fere aequantes, 7–8 cm. longae, 2 cm. latae. *Flores* magni, suberecti, partim virides, partim albi; pedicellus cum ovario 3.5–6 cm. longus. *Sepalum* intermedium erectum, late lanceolatum, breviter acuminatum, 3.5–4.25 cm. longum, 1.5–2 cm. latum; sepala lateralia patentia, oblique sigmoideo-lanceolata, apice deflexim acuminata, 3.75–4.5 cm. longa, 1.25–1.5 cm. lata; sepala omnia viridia, septemnervia. *Petala* libera, ex ungue cuneato falcitim semi-ovata, superne angustata \pm spiraliter torta, 4.5–4.75 cm. longa, medio 0.75–1.25 cm. lata, papillato-puberula et breviter ciliolata, inaequaliter septemnervia, alba. *Labellum* ex ungue ligulato superne sensim dilatato 1.5–2 cm. longo 4–5 mm. lato profunde trilobatum, totum 4–5.5 cm. longum, 4.5–5 cm. latum, fere omnino puberulum; lobus intermedius late linearis, apice obtusus, 3–3.75 cm. longus, 1.5–2.5 mm. latus; lobi laterales ab intermedio angulo acuto divergentes, leviter arcuatim incurvati, lineares, 2.75–3.25 cm. longi, basi 2.5–3 mm. lati, margine exteriori pectinato-fimbriati, fimbriis (vel segmentis secundariis) circiter 14 lineari-filiformibus 1–2.25 cm. longis 0.5–1 mm. latis viridi-albis; lobi et unguis pars distalis dense puberuli; calcar dependens, cylindricum, triente apicali modice clavatim dilatatum, 15–19 cm. longum, superne 3–4 mm. diametro, glabrum. *Anthera* erecta, 9–13 mm. alta, apice emarginata, connectivo \pm hippocrepidiformi 11–14 mm. lato, loculis reclinato-adscendentibus 12–13 mm. longis, canalibus adscendenti-porrectis gracilibus 11–12 mm. longis, staminodiis ellipsoideo-clavatis 2 mm. longis. *Brachia* stigmatifera decurvata, dimidio basali rostello adnata, tota circiter 2.25 cm. longa; pars receptiva 3–4 mm. stipitata, clavato-incrassata, 8–9 mm. longa, arcuatim decurvata; rostellii lobus intermedius perlate deltoideus, 3–4 mm. altus; ovarium 6-costatum, 3–4 cm. longum, glabrum.

FRENCH CAMEROONS. Between Ngaou-Ndéré and Meiganga, July 1939, *Jacques-Félix* 4379 (type).

KENYA COLONY. Kakamega, 1530 m. alt., June 1944, *Carroll* H32; same locality, July 1947, *Barney in Bally* 5194.—Vern. name, *Lubokoi*.

This is probably the finest species of sect. *Multipartitae*, having slightly larger flowers than *H. splendor* Summerh. and a spur even longer than in *H. cavatibrachia* Summerh. Apart from flower size, the very pointed sepals and tall anther-connective are distinguishing features of the present species. It is clear that our present knowledge of its distribution is woefully incomplete, there being a distance of about 1500 miles between the two localities from which it has been recorded.

Bonatea porrecta (Bolus) Summerhayes, comb. nov.

Habenaria porrecta Bolus in Journ. Linn. Soc. Lond. Bot. **25**, 167, 168, fig. 5 (1889).

In floral structure this appears to be a typical member of the genus *Bonatea*, possessing especially the lateral sepals united to the lower part of the lip and stigmatic arms, the large cucullate rostellum, and the distinct tooth in front of the mouth of the spur. It may be distinguished from the other species, except *B. stereophylla* (Kraenzl.) Summerh., by the leaves withering when or just before the flowers open. From the above species it differs in the considerably smaller flowers.

As regards the genus *Bonatea*, a careful examination of all the species shows clearly that it is a good genus, closely allied to, but quite distinct from *Habenaria*. Schlechter in two places (Ann. Transv. Mus. **10**, 245 : 1924 and Engl. Bot. Jahrb. **53**, 507-508 : 1915) states that the genus is untenable as *Habenaria* is at present constituted, referring in each case to Rolfe's treatment of the two genera in Flora Capensis (**5**, iii. 117-142 : 1912). In his 1924 paper he mentions several South African species of *Habenaria* which, he says, connect up that genus with *Bonatea*. Three of these, namely, *H. porrecta* Bolus (mentioned above), *H. polypodantha* Rchb. f. and *H. saundersiae* Harv., evidently belong to *Bonatea*, of which genus they possess all the characters as given by Rolfe. The fourth species, *H. clavata* Lindl., is a typical member of sect. *Ceratopetalae* of *Habenaria* and I fail to see in what way it resembles any of the other three species. As indicated in the discussion under *B. tentaculifera* Summerh., described below, the genus *Bonatea* seems in some respects to be closer to sect. *Pentaceras* of *Habenaria* than to sect. *Ceratopetalae*.

In addition to the characteristic facies of the flowers in *Bonatea* and the generic characters given by Rolfe, another character is provided by the occurrence of a small erect tooth in the mouth of the spur. This is mentioned several times in the specific descriptions in Flora Capensis and is also clearly shown in some of Bolus' illustrations of South African orchids. It is present in all species of *Bonatea*, but is not found in *H. clavata* Lindl. nor in most other African species of *Habenaria*. *H. arenaria* Lindl., in which, as pointed out by Schlechter, such a tooth does occur, does not resemble *Bonatea* in any other respect. Judging from Schlechter's remarks (Engler's Bot. Jahrb. **53**, 508) he was quite unaware of the constant occurrence of this tooth in the genus *Bonatea*.

Bonatea stereophylla (Kraenzl.) Summerhayes, comb. nov.

Habenaria stereophylla Kraenzl. in Engl. Bot. Jahrb. **30**, 280 (1901).

Although I have not seen the type specimen of this species, there seems to be little doubt from the description that it is a true *Bonatea*. It is clearly allied to *B. porrecta* (Bolus) Summerh., the leaves in both species withering before or by the time of flowering. The flowers in *B. stereophylla* are, however, nearly twice as large as in the South African species. Kraenzlin's reference to the "dicken, aber sterilen processus stigmaticus" in front of the rostellum at the mouth of the spur clearly applies to the tooth-like outgrowth of the lip which provides one of the generic characters of *Bonatea*.

Bonatea tentaculifera *Summerhayes*, sp. nov. ; a *B. volkensiana* (Kraenzl.) Rolfe foliis majoribus, racemo magis florifero, petali partitione posteriore latiore falcatis curvata, partitione anteriore ut labelli partitionibus lateralibus tenuissimis plus 5 cm. longis, calcaris brevioris, rostellis lobis lateralibus (et antherae canalibus) pro genere brevibus, lobo intermedio apice non apiculato facile distinguenda.

Herba terrestris, erecta, usque ad 60 cm. alta ; tubera non visa. *Caulis* crassiusculus, verosimiliter teres, usque ad racemi basin dense foliatus, basi circiter 5 mm. diametro. *Folia* 10 (vel ultra), \pm imbricata, inferiora elliptica vel lanceolato-elliptica, apice rotundata, acuta vel brevissima lateque acuminata, basi angustata, usque ad 13 cm. longa et 5 cm. lata, sursum decrescentia, suprema multo minora, lanceolata, acuminata, in bracteas abeuntia. *Racemus* dense multiflorus, circiter 25 cm. longus, tentaculis exclusis circiter 5 cm. diametro ; bracteae lanceolatae, acuminatae, 2-4 cm. longae, floribus breviores. *Flores* erecto-patentes vel suberecti, virides, fere omnino glabri ; pedicellus cum ovario circiter 2.5 cm. longus. *Sepalum* intermedium — erectum, elliptico-lanceolatum, acutum, concavum, circiter 17.5 mm. longum et 8 mm. latum ; sepala lateraliter patentia, oblique lanceolata, acuta vel leviter acuminata, circiter 18 mm. longa et 6-7 mm. lata, basi per 5 mm. cum labelli basi, petalorum partitionibus anterioribus et brachiis stigmatiferis connata ; sepala omnia sub-quinquenervia. *Petala* fere ad basin bipartita ; partitio posterior erecta, falcatis vel curvatim triangulari-lanceolata, apice acute vel breviter acuminata, basi ipsa leviter dilatata, circiter 17-18 mm. longa, medio 6 mm. lata, glabra, subquadrinervia, sepalo intermedio leviter cohaerens, marginibus brevissime ciliolatis ; partitio anterior basi deflexa, linearis, deinde sursum recurvata, sursum sensim angustata, tenuissima, tentacula similis, circiter 5.5 cm. longa, basi 1.5 mm. lata. *Labellum* e basi cuneato-ligulata circiter 6 mm. longa inferne appendice nasiformi ore calcaris anteposito instructa tripartitum ; partitio intermedia oblancheolata-ligulata, subacuta, circiter 18-19 mm. longa, paulo supra medium 2.5 mm. lata ; partitiones laterales intermedia multo longiores, petali partitionibus anterioribus similes, 6.5 cm. longae, basi 1 mm. latae ; calcar dependens, fere rectum, dimidio basali anguste cylindricum, superne modice inflatum, apice rotundatum, circiter 2.75 cm. longum et supra medium 2.5 mm. diametro. *Columna* (anthera inclusa) crassa, 5.5 mm. longa ; anthera erecta, superne leviter incurvata, non apiculata, canalibus gracilibus rostellis lobis lateralibus adnatis circiter 4 mm. longis ; staminodia oblonga, \pm bilobata, circiter 1 mm. longa ; rostellum columna antepositum, trilobum ; lobus intermedius erectus, rotundato-cucullatus, apice non apiculatus, dense papillatus, 2.5 mm. altus ; lobi laterales incurvatim deflexi, 2 mm. longi ; brachia stigmatifera deflexa, clavata, apice acutiuscula, leviter incurvata, 7 mm. longa, basi per 3 mm. cum labello connata, parte stigmatifera leviter excavata.

KENYA COLONY. Nairobi, City Park, 1650 m. alt., in forest, April 1945, *Mountford in Herb. Bally* B4403 (type).

The discovery of this remarkable species so near to the capital of Kenya Colony provides clear evidence, even if none else were available, of our profound ignorance of the East African flora.

The species is an especially interesting one because it is a link between the normal members of the genus *Bonatea* and the section *Pentaceras* of *Habenaria*. In most of the floral characters it is a true member of *Bonatea*, in such respects, for instance, as the general habit and flower size, the fusion of the lateral sepals, base of the lip, anterior petal-lobe and stigmatic arms (though the fusion is much shorter than in most species), the tooth in front of the spur-mouth, the large cucullate rostellum and the clavate stigmas.

The rostellum, however, differs in certain respects from all other species of the genus which I have seen. The middle lobe, though cucullate, is quite rounded at the apex without the apiculus characteristic of the other species. The side lobes, instead of being quite straight, pointing upwards and as long as or longer than the middle lobe, point more or less down, though they are gently incurved, and are considerably shorter than the middle lobe.

The general floral set-up is very reminiscent of some species of sect. *Pentaceras* of *Habenaria*, in which the relativity and shapes of many of the parts are similar. In this group, however, there is no tooth at the column mouth, while the rostellum middle lobe is comparatively small and triangular. The stigmas in the two groups resemble one another closely and are quite different from the capitate stigmas in sect. *Ceratopetalae* with which Schlechter has compared *Bonatea*.

Bonatea arabica (Deflers) Summerhayes, comb. nov.

Bicornella arabica Deflers, Voyage au Yémen, 208, t. VI (1889).

Habenaria arabica (Deflers) Kraenzl. Orch. Gen. & Sp. **1**, 184 (1897).

From the original description and figure it is clear that this is a species of *Bonatea*. It is the earliest described species with a long spur and may prove on further investigation to be the same as one of the Tropical African species of this affinity.

Roeperocharis urbaniana Kraenzl. Xenia Orchid. **3**, 104, t. 258, fig. 9-12 (1892).

Habenaria setigera Chiov. in Ann. di Bot. Roma, **9**, 137 (1911).

Examination of the Type Specimen of *H. setigera* (Chiovenda 1784) shows conclusively that it is not a *Habenaria*, but is referable to the genus *Roeperocharis*, of which it possesses the characteristic column structure, and in which it is clearly identical with *R. urbaniana* Kraenzl.

Disa zombica N.E.Br. in Dyer, Fl. Trop. Afr. **7**, 278 (1898).

D. nyassana Schltr. in Engl. Bot. Jahrb. **53**, 538 (1915).

On examination of the two type gatherings I can see no differences between the above species. It is significant that Schlechter makes no reference to *D. zombica* in his comments on his new species, but refers instead to a Madagascar species.

Satyrium kitimboense Kraenzl. in Engl. Bot. Jahrb. **51**, 380 (1914), *ketumbense*, sphalm.

At the end of the description of *Satyrium* "*ketumbense*" Kraenzlin cites two specimens, one of which is said to come from Sekanja and Ketembe

(Kassner 2290), the specific epithet being apparently derived from this latter locality. Examination of a duplicate of this gathering (the type gathering, as the description shows) in the Brussels Herbarium shows that the locality "Ketembe" should really be Kitimbo. On page 375 of the paper in which *S. ketumbense* is published we find another new species, *Habenaria kitimboana* Kraenzl., which is said to come from Kitimbo (Kassner 2290a). On reading Kassner's account of his trip through this part of the Belgian Congo and on the dates mentioned on the labels (January 11-15, 1908), we find the village of Kitimbo mentioned but no other name at all resembling this.

It therefore seems clear that Kraenzlin misread the label of Kassner's gathering no. 2290 and the spelling *ketumbense* is an unintentional orthographic error. I am correcting this spelling so as to bring it into line with Kraenzlin's own spelling under *Habenaria* mentioned above.

Satyrium chlorocorys *Rehb. f.* ex H. H. Johnston, Kilimanjaro Exped. Append. 346 (1886), nomen; ex Rolfe in Dyer, Fl. Trop. Afr. **7**, 268 (1898), descr.

S. kraenzlinii Rolfe in Dyer, Fl. Trop. Afr. **7**, 269 (1898).

I fail to see any differences between the above two species on examination of the type specimens. Rolfe distinguishes them by the degree of adnation of the lip to the sepals. So far as I can see the adnation varies from about one half to one third of the length of the lip, and I feel that Rolfe must have unintentionally torn the flowers of *S. kraenzlinii* in which he found only a quarter of the lip adnate.

Polystachya odorata Lindl. in Journ. Linn. Soc. Lond. Bot. **6**, 130 (1862), var. **trilepidis** *Summerhayes*, var. nov.; a typo foliis multo angustioribus magis recurvatis, inflorescentiis pro rata longioribus minus ramosis, labello magis recurvato, lobis lateralibus obtusis differt.

Folia lanceolato-linearia vel lanceolato-ligulata, valde recurvata, apice \pm acuta, 10-20 cm. longa, 3-16 mm. lata. *Inflorescentiae* usque ad 35 cm. altae, ramis usque ad 4 saepissime simplicibus.

NIGERIA. Ondo Province, Idanre Hills, Carter's Peak, at edges of *Trilepis* patches on granite of upper slopes and summit, April 1943, *Symington* Forest Herb. no. 3374; Aug. 1946, *Jones* Forest Herb. no. 20729 (type); Oct. 1946, *Keay & Onochie* Forest Herb. no. 21559: "Leaves pale or yellowish-green. Flowers pale or clear yellow, lip cream."

This interesting discovery is at first sight very different from *P. odorata* owing to the narrow leaves and not much branched panicle. In floral structure, however, the two agree very closely, except that the middle lobe of the lip is rather more recurved in the new variety and the side lobes are much less acute. The varietal name is given in allusion to the habitat of the plant, which grows at the edges of the extensive mats of *Trilepis pilosa* Boeck.

Polystachya (§ **Superpositae**) **eurygnatha** *Summerhayes*, sp. nov.; affinis *P. fusiformi* (Thou.) Lindl., a qua floribus maioribus mento pro rata magno lato, labelli lobis lateralibus brevibus rotundatis satis differt.

Herba verosimiliter epiphytica ; radices non visae. *Caules* (vel pseudobulbi) superpositi, e praecedentium medio vel parte superiore exorientes, cylindrici vel \pm fusiformes, 4-12 cm. longi, 3-4 mm. diametro, primo inferne vaginis 3-4 laxiusculis \pm truncatis vel obtusis obtecti, superne 3-5-foliati, deinde vaginis scariosis longitudinaliter costulatis fere omnino obtecti. *Folia* \pm patentia, lanceolato-vel ligulato-oblonga, acuta, 2-8 cm. longa, 5-15 mm. lata, siccitate firme chartacea, laete viridia. *Inflorescentia* terminalis, laxiuscule paniculata, ramis 3-4, tota 4-7 cm. longa, multiflora ; pedunculus 2-3 cm. longus, gracilis, leviter anceps, ut rhachides dense pubescens ; rhachis fractiflexa, teres ; rami 1.5-2.5 cm. longi ; bracteae e basi lata lanceolatae, acuminatae, 1.5-6 mm. longae, basi tantum pubescentes. *Flores* patentis, glabri, virides, labello flavido-viridi, anthera brunnea ; pedicellus brevis, 1-1.5 mm. longus. *Sepalum* intermedium leviter incurvatum, elliptico-oblongum, obtusum, concavum, circiter 4.5 mm. longum et 2.5 mm. latum ; sepala lateralibus oblique triangulari-ovata, apiculata, margine antico (longiore) 6 mm. longa, basi 4.5-5 mm. lata, cum pede columnae adnata mentum latum rotundatum leviter incurvatum apice breviter bilobulatum 3.5 mm. longum et 3 mm. latum formantia. *Petala* spathulato-oblonga, apice fere rotundata, 3.5 mm. longa, 1.25 mm. lata, uninervia. *Labellum* valde curvatum, e basi late unguiculata trilobatum, totum (explanatum) circiter 5.5 mm. longum et 3.5 mm. latum, marginibus recurvatis ; lobi laterales breves, lati, rotundati, ut disco ecalloso pro rata tenues ; lobus intermedius latissime quadrato-ovatus, antice \pm truncatus, carnosus, rugulosus, 2.25 mm. longus, 2.8 mm. latus, marginibus \pm crenulatis, apice recurvatus. *Columna* semiteres, 2-2.5 mm. longa ; androclinium reclinatum, leviter excavatum ; anthera hemisphaerica, antice truncata sed breviter bidentata ; pollinia 4, paulo inaequalia, quadrata, \pm complanata, 0.6 mm. longa, stipite lineari sursum angustato 0.6 mm. longo, viscidio parvo transverse fusiformi ; rostellum haud productum ; fovea stigmatica transverse elliptica ; ovarium obtuse trigonum, circiter 3.5 mm. longum, sparse pubescens.

KENYA COLONY. Kericho District, Itare, Dec. 1941 and March 1943, Copley 58 (type).

Of this species I have seen a coloured drawing made in 1940, spirit material obtained in 1941 and dried specimens collected in 1943, all from the same locality and agreeing well with one another.

The species is clearly closely related to the widespread *P. fusiformis* (Thou.) Lindl. with which it agrees in general habit, but differs in the considerably larger flowers and the very big mentum (and lip), which is much larger than the dorsal sepal and petals. The specific epithet is given in allusion to this prominent feature. Associated with the larger mentum is a relatively long lip in which the lateral lobes are comparatively small and nothing like so well defined as in *P. fusiformis*.

Eulophia stenophylla Summerhayes, nom. nov.

Lissochilus micranthus Kraenzl. in Engl. Bot. Jahrb. **17**, 53 (1893).

Owing to the existence of *Eulophia micrantha* Lindl. (now known as *Acrolophia micrantha* (Lindl.) Schltr. & Bolus) the trivial *micrantha* cannot

be used in the genus *Eulophia* for the present plant. The species is well-marked among its allies by its long narrow leaves, never exceeding 2 cm. in width and usually less than 13 mm., which are almost fully grown when the flowers open, and the small flowers (2.5 cm. or less in diameter) in which the sepals are longer than the petals.

RANGAERIS (Schltr.) Summerh.

When I first described this genus (Kew Bull. 1936, 227), I deliberately refrained from making new combinations for all the various species included by Schlechter in his section *Rangaeris* of the genus *Aëranthis* Rchb. f. I was doubtful about the distinctness of some of these species and also whether they really belonged to the group.

Since then I have received a large amount of material from East Africa which appeared to be referable to *Rangaeris*, so I have carried out an examination of all the species concerned, including type specimens where these are available. As a result I have had to reduce drastically the supposed number of species, partly because some of them are conspecific with earlier described species and partly because, in my opinion, others are better placed elsewhere.

For example, of the nine species enumerated by Schlechter, four (*Aëranthis cordatiglandula* De Wildem., Schltr., *A. engleriana* (Kraenzl.) Schltr., *A. mixta* Schltr. and *A. solheidi* (De Wildem.) Schltr. are conspecific with other species, while three (*A. filipes* (Schltr.) Schltr., *A. graminifolia* (Kraenzl.) Schltr. and *A. potamophila* (Schltr.) Schltr.) are referable to other genera. The first of these is probably a species of *Diaphananche*, while the third is a true *Angraecum*, in which genus it was first described by Schlechter. *A. graminifolia* (Kraenzl.) Schltr. is apparently referable to a new genus which is described later in this paper.

Angraecum dorotheae Rendle, referred by me formerly to *Rangaeris*, is in my opinion more properly placed in *Diaphananche*.

As I now understand the genus it contains six species, falling into two sections, but it is possible that the second section will have eventually to be treated as a distinct genus. The original generic description given by me is still quite applicable and needs practically no modification.

A conspectus of and key to the species follows, with notes on several of the species.

Rangaeris (Schltr.) Summerh. in Kew Bull. 1936, 227, pro maxime parte. Sectio 1. **Eu-rangaeris** Summerh. sect. nov.—Rostellum viscidio amoto trifidum vel bifidum, lobo intermedio quam lateralibus multo brevius vel nullo; viscidium magnum, rectangulare vel cordatum, stipitibus duobus.

Species typica sectionis.—*R. muscicola* (Rchb. f.) Summerh.

1. *R. muscicola* (Rchb. f.) Summerh.
2. *R. rhipsalisocia* (Rchb. f.) Summerh.
3. *R. amaniensis* (Kraenzl.) Summerh.
4. *R. longicaudata* (Rolfe) Summerh.
5. *R. trilobata* Summerh.

Sectio 2. **Biglandulosae** *Summerh.* sect. nov. —Rostellum viscidio amoto trilobatum, lobo intermedio quam lateralibus longiore ; viscidia dua, pro rata parva.

6. R. brachyceras (*Summerh.*) *Summerh.*

Key to Species

Viscidia 2, small, \pm elliptical ; side lobes of rostellum shorter than middle lobe ; spur not much longer than lip, 5–8 mm. long, almost straight ; stem elongated ; leaves strap-shaped, slightly unequally bilobed at the apex, 6–12 cm. long, 8–16 mm. broad ; inflorescences more or less erect, about equalling the leaves, with numerous small flowers ; lip broadly lanceolate, not at all lobed in lower part
6 *brachyceras*

Viscidium 1, large, \pm rectangular or cordate ; side lobes of rostellum longer than middle lobe ; spur usually several times longer than lip, or if only twice as long, sharply incurved near apex :

Stem short, with leaves in a bunch ; leaves 7–16 cm. long, 8–12 mm. broad ; lip broadly lanceolate or ovate, apex thickened, base not at all or only very obscurely lobed ; stipites of pollinia very slender, not flattened :

Leaves strap-shaped, more or less V-shaped in section, conduplicate at base, shortly bilobed at apex ; spur thread-like, 5–9 cm. long ; ovary glabrous 1 *muscicola*

Leaves *Iris*-like, flattened in a vertical plane, acute at apex ; spur stout, sharply incurved towards apex, 8–14 mm. long ; ovary pubescent 2 *rhipsalisocia*

Stem elongated, leafy for a long distance ; lip lanceolate or narrowly lanceolate, often with distinct rounded lobes in lower part ; spur at least 5 cm. long :

Lip narrowly lanceolate, quite entire, acuminate ; rostellum bifid, lobes obtuse ; leaves 9–11 cm. long, 10–14 mm. broad ; spur 15 cm. long ; stipites of pollinia much widened and flattened above 4 *longicaudata*

Lip lanceolate with rounded more or less distinct lobes in lower part, obtuse or subacute ; rostellum trifid, lateral lobes more or less acute :

Leaves 2–5 cm. apart on a slender stem, lanceolate, acutely bilobed at apex, 5–7 cm. long, 10–16 mm. broad, thin in texture ; aerial roots very slender, only about 1–2 mm. in diameter ; lip with two distinct rounded or dentate lobes at the base, spur about 5 cm. long ; stipites of pollinia terete, not at all widened above 5 *trilobata*

Leaves 1–2 cm. apart on a thick stem, oblong or broadly ligulate with 2 broad rounded lobes at the apex, 3–11 cm. long, 10–15 mm. broad, fleshy ; aerial roots rather stout, 3–6 mm. in diameter ; lip with obscure rounded lobes in lower half or about the middle, spur 8–15 cm. long ; stipites of pollinia widened and flattened above 3 *amaniensis*

1. **Rangaeris muscicola** (Rchb. f.) Summerhayes in Hutch. & Dalz. Fl. West Trop. Afr. **2**, 450 (1936).
Aëranthus muscicola Rchb. f. in Flora, **48**, 190 (1865).
Angraecum englerianum Kraenzl. in Engl. Bot. Jahrb. **7**, 333 (1886), et **17**, 61, t. IV (1893).
Listrostachys engleriana (Kraenzl.) Kraenzl. in Engl. Bot. Jahrb. **19**, 254 (1894), in obs.
Mystacidium muscicola ("muscicolum") (Rchb. f.) Dur. & Schinz, Conspect. Fl. Afr. **5**, 54 (1895).
Listrostachys muscicola (Rchb. f.) Rolfe in Dyer, Fl. Trop. Afr. **7**, 158 (1897).
Mystacidium batesii Rolfe, l.c. 172 (1897).
Angraecum batesii (Rolfe) Schltr. West-Afr. Kautsch. Exped. 283 (1900), non Rolfe.
Aërangis falcifolia Schltr. in Engl. Bot. Jahrb. **53**, 598 (1915).
A. muscicola (Rchb. f.) Schltr. l.c. 599 (1915), in obs.
A. engleriana (Kraenzl.) Schltr. l.c., in obs.
Angraecum solheidi De Wildem. in Bull. Jard. Bot. Brux. **5**, 191 (1916).
Listrostachys solheidi De Wildem. l.c., in syn.
Aërangis mixta Schltr. in Beih. Bot. Centralbl. **36**, ii. 122 (1918).
A. solheidi (De Wildem.) Schltr. l.c. 123 (1918).
Listrostachys floribunda Rolfe in Kew Bull. **1918**, 236.
Aërangis floribunda (Rolfe) Summerh. in Kew Bull. **1932**, 509.

An examination of type specimens and descriptions shows without doubt that the above extensive synonymy has reference to a single widespread species. Schlechter suggests that the references in volumes 7 and 17 of Engler's *Botanisches Jahrbücher* under the name *Angraecum englerianum* Kraenzl. are to two different species, but I can see nothing to support this view.

The species is a comparatively uniform one varying markedly only in the length of the spur and less so in the relative width of the lip. It occurs from Sierra Leone in the west throughout almost the whole of Tropical Africa, extending to Natal in the south-east. It may be distinguished by the relatively short stems. V-shaped distichous strap-like leaves, and small long-spurred fragrant creamy-white flowers.

2. **Rangaeris rhipsalisocia** (Rchb. f.) Summerhayes in Hutch. & Dalz. Fl. West Trop. Afr. **2**, 450 (1936).
Angraecum rhipsalisocium Rchb. f. in Flora, **48**, 189 (1865).
Listrostachys trachypus Kraenzl. in Engl. Bot. Jahrb. **19**, 253 (1894).
L. rhipsalisocia (Rchb. f.) Rolfe in Dyer, Fl. Trop. Afr. **7**, 158 (1897).
Angraecum cordatiglandulum De Wildem. in Bull. Jard. Bot. Brux. **5**, 184 (1916).
Listrostachys cordatiglandula De Wildem. l.c., in syn.
Aërangis rhipsalisocia (Rchb. f.) Schltr. in Beih. Bot. Centralbl. **36**, ii. 123 (1918).

Listrostachys colarum A. Chev. Expl. Bot. Afr. Occ. Franç. **1**, 622 (1920), nomen.

A widely spread species which has been described several times under different names. It is clearly allied to *R. muscicola* (Rchb. f.) Summerh. but is easily distinguished by the acute *Iris*-like leaves, hairy ovary, short hooked spur and heart-shaped viscidium. Its range extends from Sierra Leone through "Upper Guinea", Cameroons and Belgian Congo to Angola. It is so far not known from East Africa.

3. ***Rangaeris amaniensis*** (Kraenzl.) Summerhayes, comb. nov.

Listrostachys amaniensis Kraenzl. in Engl. Bot. Jahrb. **43**, 397 (1909).

Leptocentrum amaniense (Kraenzl.) Schltr. in Beih. Bot. Centralbl. **36**, ii. 112 (1918).

Cyrtorchis cufodontii Chiov. in Miss. Biol. Borana, Racc. Bot., Angios.-Gymnos. 335, f. 113 (1939).

This striking species is correctly placed in *Rangaeris*, not in either *Leptocentrum* or *Cyrtorchis*. The column structure, rostellum and pollinarium are all similar to those in other members of the genus *Rangaeris*. The two stipites, which thicken slightly from the base upwards, are intermediate between those in *R. muscicola* (Rchb. f.) Summerh., where they are hardly thickened at all, and those in *R. longicaudata* (Rolf.) Summerh., which are considerably thickened in the upper part. In all three species the viscidium is rectangular, and, on removal, leaves a trilobed rostellum with the side lobes longer than the central tooth-like lobe.

There is very considerable variation in the size of the flowers, the tepals in different plants being from 1–2.8 cm. in length, but practically all intermediates have been seen. The lower half of the lip is broader, with on each side at or just below the middle a sort of rounded very obscure side-lobe; the upper half is either ligulate and subobtusate or sometimes quite tapering and acute. Vegetatively the plants are very uniform, the stems being long and often much branched, with a number of relatively short fleshy strap-shaped leaves, which are almost equally and very obtusely bilobed at the apex.

I have seen the following gatherings of this species, most of which are in the Kew Herbarium :—

ERITREA. Arero (Meta Gafersa), Feb.–July 1937, *Cufodontis* 317 (type of *Cyrtorchis cufodontii* Chiov.—Herb. Florence).

UGANDA. Karamoja, Warr, 1500 m., alt., riparian scrub, Nov. 1939, *Thomas* 3181.

KENYA COLONY. Northern Frontier District, Mt. Kulal, 1800 m. alt., on cedar trees, Oct. 1947, *Bally* 5528; same locality, 1770 m. alt., on forest trees, *Bally* 5684; Loldaika Hills, N.W. of Mt. Kenya, 2100 m. alt., on *Akocanthera*, July, 1944, *Moreau* 582; Nairobi, 1590–1800 m. alt., between 1916 and 1946, *Dowson* 373; *Napier* 1834, 5214; *Gray* 2; *Moreau* 164; *Tweddie* 662; *Copley* 3; Ngong, 1710 m. alt., Oct. 1938, *C.-van Someren* 60; Koru, Jan.–March 1937, *C.-van Someren* 2; near Mbagaltu stream, March 1933, *Rogers* 463; Mua Hills, W. of Machako's, 2100 m. alt., July 1937, *C.-van Someren* 61; Machako's, 1350 m. alt.,

July, 1944, *Moreau* 154A; Muka, June 1902, *Kauser* 903; Chyulu Hills, N. part, 1500 m. alt., on isolated trees in grassland, *Bally* 3304; no locality, on trees in dry places, Sept.-Oct. 1938, *Bally* 9052.

Tanzania *Tanzania*. Arusha, foot of Mt. Meru south side, 1620 m. alt., coll. N. R. Puggles Couchman, cult. & flowered Arusha, March 1944, *Moreau* 315B; Mkomoti, east slopes of Kilimanjaro, 1350 m. alt., on isolated *Ficus acida*, coll. W. V. Harris, cult. & flowered Arusha, April 1944, *Moreau* 143; Loliboni Mt., 50 miles S. of Moshi, 1950 m. alt., epiphyte in evergreen forest, coll. F. M. Page Jones, cult. & flowered Arusha, Dec. 1943, *Moreau* 370; West Usambara Mts., Bumbuli, 1350 m. alt., cult. & flowered Arusha, Dec. 1942, *Moreau* 148; East Usambara Mts., Arusha, Mar. 1907, *Bruce* 1551 type; Usumbu Mts., S. slope, cult. & flowered Arusha, March 1943, *Moreau* 315; Mbulu Distr., Mt. Hanang, Nangwa, N.E. slopes, 2740 m. alt., epiphyte in dry evergreen forest, Feb. 1946, *Greenway*, 1596; Marang Forest, 1800 m. alt., epiphyte in dry evergreen forest, June 1932, *Moreau* 318; Kilobiani Mt., just N. of Mpwapwa, 1630 m. alt., on rough barked trees, cult. & flowered Arusha, Nov. 1942, *Moreau* 40; same locality, etc., coll. P. J. Greenway, cult. & flowered Arusha, Nov. 1943, *Moreau* 40A; between Mpwapwa and Kilosa, 1090 m. alt., on *Ficus* *sp.* in dry thickets, Sept. 1933, *Burt* 4813; Mochi, 5 miles N.W. of Morogoro, 1350 m. alt., cult. & flowered Arusha, Jan. 1944, *Moreau* 689.

The species occurs as an epiphyte or on rocks in dry evergreen forest, in thickets, or on isolated trees in savanna regions.

7. *Rangaeria trilobata* Summerh. in Kew Bull. 1936, 223.

I have now seen material of this very distinct looking species from Gabon (*Le Testu* 1405), as well as the original collection from Nigeria. In the Gabon material the flowers are slightly smaller, while the basal lobes of the lip are coarsely crenate, but otherwise the two gatherings agree admirably. The front of the anther is drawn out into a truncate process covering the pollinarium as in some of the other species.

8. *Rangaeria brachyceras* Summerh. Summerh. in Kew Bull. 1936, 228.

Aëragis brachyceras Summerh. in Kew Bull. 1934, 213.

Rangaeria biglandulosa Summerh. in Kew Bull. 1936, 228.

Further consideration of these two species, of which I have now seen additional gatherings, shows that the supposed differences between them are either of no specific value or are non-existent. There is always a short foot to the column, the lateral sepals and petals arising from this. The two varieties are always distinct, the original ones examined in *R. brachyceras* having no doubt become adherent in the course of drying.

The species has two known centres of distribution, one in French Guinea and Sierra Leone, and the other in the central and east African mountain region, extending from the Wringa Mts. in the west to Mount Elgon and the Kakamega Forest in Kenya Colony in the east.

Ypsilopus Summerhayes, gen. nov.

Sepala et petala libera, patentia, lanceolata vel oblongo-lanceolata, petalis quam sepalis paulo minoribus et angustioribus. Labellum

rhomboideo-lanceolatum, medio vel infra medium utrinque obscure angulatum, calcariferum; calcar anguste cylindricum, quam pedicellus triplo longius. *Columna* apoda, brevis; androclinium transversum, leviter excavatum; rostellum productum, deflexum, apice truncatum dilatatum, primum indivisum, viscidio amoto \pm bifidum. *Anthera* cucullata, hemisphaerica, antice vix producta; pollinia 2, \pm ellipsoidea, stipite uno superne bibrachiato brachiis apice dilatatis obtusis, viscidio communi reniformi antice emarginato instructa.

Planta epiphytica; caulis brevis, crebre foliatus, pendula; folia pauca, lamina anguste lineari apice \pm integra oblique articulata; inflorescentiae verosimiliter solitaires, ex axillis foliorum delapsorum natae, pauciflorae, bracteis parvis; flores mediocres, albi.

Species una vel dua, Africae tropicae indigenae.

Species typica.—*Y. longifolia* (Kraenzl.) Summerh.

1. ***Ypsilopus longifolia*** (Kraenzl.) Summerhayes, comb. nov.
Mystacidium longifolium Kraenzl. in Engl. Bot. Jahrb. **17**, 57 1893.
2. ? ***Y. graminifolia*** (Kraenzl.) Summerhayes, comb. nov.
Listrostachys graminifolia Kraenzl. in Engl. Pflanzenw. Ost-Afr. **C**, 158 (1895), et in Engl. Bot. Jahrb. **22**, 29 (1895).
Aërangis graminifolia (Kraenzl.) Schltr. in Beih. Bot. Centralbl. **36**, ii. 122 (1918).

The plants here dealt with show a combination of characters which prevents their inclusion in any known genus of Angraecoid orchids. In the first place are the extremely narrow grass-like leaves, of which the lamina articulates from the sheath so obliquely that the sheaths are quite acute after the fall of the lamina and were thought by Kraenzlin to be of a different origin from the foliage leaves. The general appearance of the flowers is that of a small flowered *Aërangis* or *Rangaeris*, but the column and pollinarium structure is quite different from those of either of these genera. The rather broad deflexed rostellum is truncate and dilated at the apex to form a broad shield-like transversely placed surface, on which is borne the large reniform viscidium. The stipes is single in the lower two-thirds, but above is forked into two divergent arms each of which bears a single pollinium. The generic name is given in allusion to this feature. On removal of the pollinarium the rostellum is bifid with truncate lobes. The affinity of the genus appears to be with *Rangaeris*.

The type species, *Y. longifolia* (Kraenzl.) Summerh., seems to be widespread; if not very common, in Kenya Colony, and also occurs in the Usambara Mts. in Tanganyika Territory. It has small white flowers about 1.5 cm. in diameter with a slender spur about 4 cm. long. The very narrow leaves are from 5–23 cm. long, but only 1.5–4 mm. wide; they have a blunt almost entire apex with only sometimes a slight suspicion of lobing. The whole plant, including leaves and inflorescences, hangs downwards from the point of attachment. The lower part of the stem is completely covered by the very acute chaffy leaf-sheaths.

I am not very certain about the exact status of the second species, *Y. graminifolia* (Kraenzl.) Summerh., as I have seen no material which I could confidently refer to it. The original description approximates closely in most features to that of *Y. longifolia* and the plant may merely

have been an extra large-flowered specimen of that species. On the other hand, Kraenzlin states that there are two distinct stipites, so the species may not even belong to the present genus. It is to be hoped that further material may be forthcoming to settle this problem. As the species cannot remain either in *Listrostachys* or in *Aërangis*, I have placed it provisionally in *Ypsilopus*. It is said to have flowers 2·3 cm. in diameter.

***Diaphananthe dorotheae* (Rendle) Summerhayes, comb. nov.**

Angraecum dorotheae Rendle, Cat. Talb. Niger. Pl. 107, t. 15, fig. 3-5 (1913).

Rangaeris dorotheae (Rendle) Summerh. in Hutch. & Dalz. Fl. West Trop. Afr. 2, 450 (1936).

In the Flora of West Tropical Africa, and in my recent revision of *Diaphananthe* (Bot. Mus. Leaflet. Harv. Univ. 12, 95-111: 1945), I excluded this species from *Diaphananthe* because of the absence of the small tooth at the mouth of the spur, this tooth being considered as a distinguishing generic character. Further investigation of this and other plants throws doubt on the value of this character. In other respects *Angraecum dorotheae* appears to fit well into the genus, being intermediate between *D. pellucida* (Lindl.) Schltr. and *D. bidens* (Sw. ex Pers.) Schltr. The column structure and the pollinarium of Rendle's species are just as in the two species mentioned. In its short tufted habit and large oblanceolate leaves the species agrees with *D. pellucida*, but in its short spreading inflorescences and the shape of the lip it resembles closely *D. bidens*.

***Plectrelminthus caudatus* (Lindl.) Summerhayes, comb. nov.**

Angraecum caudatum Lindl. in Edw. Bot. Reg. 22, t. 1844 (1836).

Plectrelminthus bicolor Rafin. Fl. Tellur. 4, 42 (1836).

Listrostachys caudata (Lindl.) Rehb. f. in Walp. Ann. 6, 907 (1864).

Leptocentrum caudatum (Lindl.) Schltr. Die Orchid. 600 (1914).

When Schlechter described the genus *Leptocentrum* (Die Orchid. 600: 1914, et Beih. Bot. Centralbl. 36, ii. 111: 1918), he was apparently unaware that the type of his new genus (*Angraecum caudatum* Lindl.) was already the type of the monotypic genus *Plectrelminthus* of Rafinesque. The latter name must therefore be adopted for Schlechter's genus although he extended Rafinesque's concept by including two other species. Rafinesque unfortunately created a new specific epithet (*bicolor*) which must, of course, be replaced by *caudatus*. I am therefore making the new combinations which are necessary under the generic name *Plectrelminthus*. It is not, I think, desirable to conserve the name *Leptocentrum*, though Rafinesque's name has not been used since its publication, because the genus is a small and unimportant one, and there is a section *Leptocentrum* of the African orchid genus *Satyrium* with which confusion might arise.

I have now seen material of *P. caudatus* from French Guinea in the extreme west (*Jacques-Félix* 975) and from Gabon (*Le Testu* 5928), both of which gatherings represent extensions of the known range of the species.

The third species included by Schlechter in *Leptocentrum*, *L. amaniense* (Kraenzl.) Schltr., does not belong to the genus, but is referred by me elsewhere in this paper to *Rangaeris*.

Plectrelminthus spiculatus (Finet) Summerhayes, comb. nov.

Rhaphidorhynchus spiculatus Finet in Mém. Soc. Bot. France, **9**, 40, t. 8, fig. 1-12 (1907).

Leptocentrum spiculatum (Finet) Schltr. in Beih. Bot. Centralbl. **36**, ii. 112 (1918).

I am not at all certain that this species is properly placed in the genus *Plectrelminthus*, but as it obviously cannot bear either of the two names already proposed for it, I am making the present combination. Further investigation may show that it should constitute a distinct genus.

Aërangis arachnopus (Rchb. f.) Schltr. in Beih. Bot. Centralbl. **36**, ii. 113 (1918).

Angraecum arachnopus Rchb. f. in Bonplandia, **2**, 93 (1854).

A. batesii Rolfe in Dyer, Fl. Trop. Afr. **7**, 139 (1897).

Aërangis batesii (Rolfe) Schltr. l.c. 114 (1918).

The original specimen of *Angraecum arachnopus* was said to have been introduced from the Gold Coast by Consul Schiller. The species has, however, never been rediscovered there, and it seems probable that Schiller's plant was brought via the Gold Coast from elsewhere. Indeed the type specimen of *A. batesii* (Bates 412, from the Cameroons) agrees very well with the material of *A. arachnopus* in the Reichenbach herbarium. Recently I have seen several excellent gatherings of this species by Mr. G. Le Testu from Gabon.

The characteristic features of the species are the long more or less flexuous inflorescence with the flowers spaced out at intervals of 3-5 cm., and the column distinctly narrowed and terete below the stigma. The spur is about 6-7 cm. in length and more or less L-shaped with the bend below the middle. There is considerable variation in the size of the leaves, which range from 7 to 18 cm. in length and from 2 to 5.5 cm. in breadth.

Mystacidium braybonae Summerhayes, sp. nov. ; *M. millari* Bolus et *M. caffro* (Bolus) Bolus simile, ab illo foliis apice retusis tantum, ab hoc calcaris longiore apice haud dilatato, ab utroque foliis pro rata brevioribus, tepalis angustioribus, rostellis lobis lateralibus papillois, pollinaris viscidiiis maioribus satis differt.

Herba epiphytica nana, glaberrima ; caulis brevissimus, circiter 2 cm. longus, radices numerosas flexuosas pauciramosas \pm virides 3-5 mm. diametro emittens, crebre 4-5-foliatus. *Folia* patentia vel \pm recurvata, oblongo-ligulata vel ligulata, basi leviter angustata conduplicata, apice acute retusa, 4-7 cm. longa, 1.2-1.6 cm. lata, supra leviter canaliculata, subtus subcarinata, subcarnosa, saturate viridia. *Inflorescentiae* ex axillis foliorum delapsorum exorientes, patentes vel leviter arcuatim recurvatae, 4-5 cm. longae, densiuscule 7-11-florae ; pedunculus brevis, circiter 1 cm. longus, vaginis paucis instructus ; rhachis fractiflexa, teres ; bractaeae 3-6 mm. distantes, breviter ochreateae, apice acutae, 1-2 mm. longae, scariosae. *Flores* distichi, patentes, albi, anthera flava, fragrantis ; pedicellus cum ovario 1-1.5 cm. longus, leviter incurvatus, medio albus, ceterum viridescens. *Sepalum* intermedium oblongo-ellipticum, basi angustatum, apice rotundatum, 8-10 mm.

longum, 3–4 mm. latum; sepala lateralia oblique oblanceolato-elliptica vel oblonga, apice rotundata, circiter 10 mm. longa et 4 mm. lata, superne \pm recurvata. *Petala* ovato-elliptica, apice rotundata, 7.5 mm. longa, 4 mm. lata. *Labellum* antice valde recurvatum, ovato-lanceolatum, inferne obscure trilobatum lobis rotundatis, apice acutum, 7.5 mm. longum, 6 mm. latum; calcar ex ore lato sensim angustatum, leviter incurvatum, apice ipso obtusum, 2–2.5 cm. longum. *Columna* brevis, crassa, leviter incurvata, circiter 3 mm. alta, androclinio levissime excavato; anthera hemisphaerica, antice in appendix brevem truncatam producta; pollinia globosa, \pm compressa, 1.2 mm. longa, stipitibus gracilibus teretibus fere 2.5 mm. longis, viscidii duobus lanceolato-oblongis 1.3 mm. longis; rostellum decurvatim productum, apice truncatum, 1 mm. longum viscidio amoto trilobatum; lobus intermedius oblongo-lanceolatus, nudus; lobi laterales intermedium aequantes, jineari-ligulati, papillosi.

TRANSVAAL. Zoutpansberg Mts., near Louis Trichardt, 1350 m. alt., Nov. 1948, Mrs. H. Braybon.

This charming little species was sent over in the living condition by air and was described from fresh material.

This is the first record of the genus being found in the Transvaal, though it is probable that some of the Natal species may grow in the south-eastern parts of the country. The present species is most closely allied to two of the southern species, and is not a near relative of *M. tanganyikensis* from farther north. As is usually the case in this very natural genus *M. braybonae* is distinguished from the other species by the combination of its characters rather than by any strikingly unique feature. The dense flowered racemes make the species more immediately attractive than many other species in which the flowers are more spaced out.

Angraecopsis comorensis Summerhayes, nóm. nov.

A. thouarsii H. Perrier in Humbert, Fl. Madag. Orchid. **2**, 84 (1941), quoad descr., excl. syn.

Finet (Mém. Soc. Bot. France, **9**, 57: 1907) proposed the new name *Mystacidium thouarsii* for the plant previously known as *Angraecum gracile* Thouars simply because of the existence of *M. gracile* Harv. His new name must therefore be attached to Thouar's plant, in spite of the fact that his remarks following the citation of references and specimens, and his illustration (t. X, fig. 17–22) refer to quite a different plant. When Perrier de la Bathie (see reference above) decided that the Pobéguin specimen described and figured by Finet was distinct from *Chamaeangis gracilis* (Thou.) Schltr. (*Angraecum gracile* Thou.) he should have given it a new specific epithet since the combination *Angraecopsis thouarsii* (Finet) H. Perrier is, like *Mystacidium thouarsii* Finet, merely a synonym of *Chamaeangis gracilis*.

As I am in agreement with Perrier de la Bathie that the Pobéguin plant is an *Angraecopsis* I have provided a new name for the species in order to regularise the position.

A NEW SPECIES OF AGROSTIS FROM INDIA.

N. L. BOR.

Agrostis wardii Bor, sp. nov. ; affinis *A. stoloniferae* L. sed 4 setis lemmatis, arista geniculata subbasale distinguenda.

Gramen perenne, caespitosum. *Culmi* erecti vel basi leviter geniculati, usque 60 cm. alti, laeves glabrique, foliorum vaginis tecti, graciles, teretes, simplices, nodis glabri. *Foliorum laminae* lineari-acuminatae, usque 25 cm. longae, 8 mm. latae, planae, supra virides, subtus paullo glaucae, marginibus scaberrimae, supra scabridae ; *vaginae* inferne breves, congregatae, superne longae, solutae, laeves glabraeque, striatae, superiores paniculam paene attingentes ; *ligulae* brevissimae, membranaceae.

Panicula plus minusve contracta, usque 14 cm. longa, 2.5 cm. lata erecta vel leviter nutans ; rhachis 5-6-nodis ; rami nodis verticillati, ramulosi, inferiores usque 6 cm. longi ; rami ramulique plus minusve scaberuli ; spicularum pedicelli spiculis aequilongi vel longiores vel breviores. *Spiculae* lineari-oblongae, 3-3.5 mm. longae, demum hiantes. *Gluma inferior* explanata lanceolata, acuta, 3-3.5 mm. longa, purpureo-tincta, carina superne scaberrima, alioquin laevis glabraque. *Gluma superior* paullo brevior, explanata ovata, acuta, carina superne scabra, purpureo-tincta, alioquin glabra laevisque. *Lemma* hyalinum, tenuiter membranaceum, 2-2.5 mm. longum, explanatum oblongo-ovatum, apice truncatum, brevissime 4-fidum, dorso praecipue prope margines pilosum, 5-nerve ; nervi quattuor ex sinibus excurrentes ; laterales quam interiores longiores ; nervus quintus ex dorso prope basin in aristam brevem productus ; *palea* 2 mm. longa, lanceolata, hyalina, 2-nervis ; *rhachilla* haud producta ; *antherae* 3, 1.5 mm. longae ; lodiculae angustae, acutae ; *arista* 6 mm. longa, geniculata, subbasalis, dimidia pars inferior torta, 2 mm. longa ; pars superior capillaris, scabra.

INDIA. Manipur State, Sirhoi Kashong, 2800 m., 8.10.48. *Kingdon-Ward*, K.W. 18145. (Typus in Herb. Kew.).

This fine grass was collected by Capt. Kingdon-Ward on the high mountain lying to the east of Ukhrul, the headquarter station of the Eastern Subdivision, Hill Districts, Manipur State, and not far distant from the Burmese frontier.

When approaching maturity the spikelets gape widely and the four setae at the top of the lemma can be seen quite distinctly.

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